



STATE OF TENNESSEE  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DIVISION OF WATER RESOURCES

William R. Snodgrass - Tennessee Tower  
312 Rosa L. Parks Avenue, 11<sup>th</sup> Floor  
Nashville, Tennessee 37243-1102

February 28, 2018

Mr. Derwin Hagood, P.E.  
Senior Vice President, Operations  
e-copy: derwin.hagood@kub.org  
Knoxville Utilities Board

Subject: **NPDES Permit No. TN0023574**  
**Knoxville Utilities Board (KUB)**  
**Knoxville, Knox County, Tennessee**

Dear Mr. Hagood:

In accordance with the provisions of the Tennessee Water Quality Control Act, Tennessee Code Annotated (T.C.A.), Sections 69-3-101 through 69-3-120, the Division of Water Resources hereby issues the enclosed NPDES Permit. The continuance and/or reissuance of this NPDES Permit is contingent upon your meeting the conditions and requirements as stated therein.

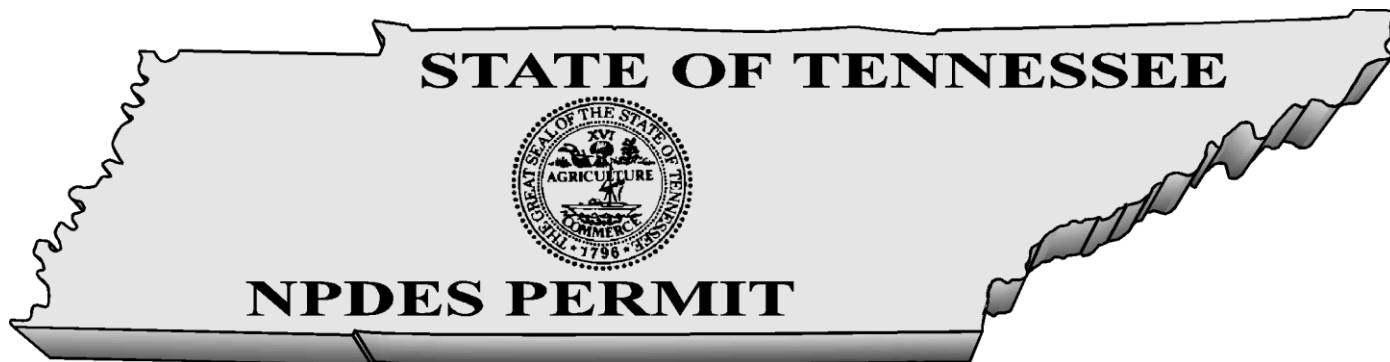
Please be advised that a petition for permit appeal may be filed, pursuant to T.C.A. Section 69-3-105, subsection (i), by the permit applicant or by any aggrieved person who participated in the public comment period or gave testimony at a formal public hearing whose appeal is based upon any of the issues that were provided to the commissioner in writing during the public comment period or in testimony at a formal public hearing on the permit application. Additionally, for those permits for which the department gives public notice of a draft permit, any permit applicant or aggrieved person may base a permit appeal on any material change to conditions in the final permit from those in the draft, unless the material change has been subject to additional opportunity for public comment. Any petition for permit appeal under this subsection (i) shall be filed with the Technical Secretary of the Water Quality, Oil and Gas Board within thirty (30) days after public notice of the commissioner's decision to issue or deny the permit. A copy of the filing should also be sent to TDEC's Office of General Counsel.

If you have questions, please contact the Knoxville Environmental Field Office at 1-888-891-TDEC; or, at this office, please contact Mr. David Matthews at (615) 532-0485 or by E-mail at *David.C.Matthews@tn.gov*.

Sincerely,

Vojin Janjić  
Manager, Water-Based Systems

cc: Permit File & Knoxville Environmental Field Office  
NPDES Permit Section, EPA Region IV, [r4npdespermits@epa.gov](mailto:r4npdespermits@epa.gov)  
Mr. William J. Meinert, PE, Vice President, O'Brien & Gere, [bill.meinert@obg.com](mailto:bill.meinert@obg.com)  
Mr. Chris D. Thomas, Knoxville Utilities Board, [chris.thomas@kub.org](mailto:chris.thomas@kub.org)  
Ms. Leslie Glover, Industrial Pretreatment Coordinator, Regulatory Compliance, Knoxville Utilities Board, [leslie.glover@kub.org](mailto:leslie.glover@kub.org)  
Mr. John Gresham, Vice President, Operations, Knoxville Utilities Board, [john.gresham@kub.org](mailto:john.gresham@kub.org)  
Mr. Steve Clettenberg, Team Lead, Plant Operations, , [steven.clettenberg@kub.org](mailto:steven.clettenberg@kub.org)



**No. TN0023574**

Authorization to discharge under the  
National Pollutant Discharge Elimination System (NPDES)

Issued By

**STATE OF TENNESSEE  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DIVISION OF WATER RESOURCES  
William R. Snodgrass - Tennessee Tower  
312 Rosa L. Parks Avenue, 11<sup>th</sup> Floor  
Nashville, Tennessee 37243-1102**

Under authority of the Tennessee Water Quality Control Act of 1977 (T.C.A. 69-3-101 et seq.) and the delegation of authority from the United States Environmental Protection Agency under the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 U.S.C. 1251, et seq.)

Discharger: **KUB - Fourth Creek WWTP**

is authorized to discharge: **treated municipal wastewater from Outfall 001**

from a facility located: **in Knoxville, Knox County, Tennessee**

to receiving waters named: **Tennessee River Mile 640**

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on: **April 1<sup>st</sup>, 2018**

This permit shall expire on: **October 31<sup>st</sup>, 2022**

Issuance date: **March 2<sup>nd</sup>, 2018**

A handwritten signature in blue ink, appearing to read "T. Calabrese", is written over a horizontal line.

for Tisha Calabrese Benton  
Director

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## 1.0. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

### 1.1. NUMERIC AND NARRATIVE EFFLUENT LIMITATIONS

The Knoxville Utilities Board is authorized to discharge treated municipal wastewater from Outfall 001 to the Tennessee River Mile 640. Discharge 001 consists of municipal wastewater from a treatment facility with a design capacity of 10.8 MGD. Discharge 001 shall be limited and monitored by the permittee as specified below:

Effluent, Outfall 001				Season: All year			
<u>Code</u>	<u>Parameter</u>	<u>Qualifier</u>	<u>Value</u>	<u>Unit</u>	<u>Sample Type</u>	<u>Monitoring Frequency</u>	<u>Statistical Base</u>
00300	Oxygen, dissolved (DO)	>=	1.0	mg/L	Grab	Daily	Instantaneous Minimum
00310	BOD, 5-day, 20 C	<=	2702	lb/d	Composite	Daily	Monthly Average
00310	BOD, 5-day, 20 C	<=	45	mg/L	Composite	Daily	Daily Maximum
00310	BOD, 5-day, 20 C	<=	40	mg/L	Composite	Daily	Weekly Average
00310	BOD, 5-day, 20 C	<=	30	mg/L	Composite	Daily	Monthly Average
00310	BOD, 5-day, 20 C	<=	3603	lb/d	Composite	Daily	Weekly Average
00400	pH	>=	6.0	SU	Grab	Daily	Minimum
00400	pH	<=	9.0	SU	Grab	Daily	Maximum
00530	Total Suspended Solids (TSS)	<=	2702	lb/d	Composite	Daily	Monthly Average
00530	Total Suspended Solids (TSS)	<=	40	mg/L	Composite	Daily	Weekly Average
00530	Total Suspended Solids (TSS)	<=	3603	lb/d	Composite	Daily	Weekly Average
00530	Total Suspended Solids (TSS)	<=	45	mg/L	Composite	Daily	Daily Maximum
00530	Total Suspended Solids (TSS)	<=	30	mg/L	Composite	Daily	Monthly Average
00545	Settleable Solids	<=	1.0	mL/L	Grab	Daily	Daily Maximum
00600	Nitrogen, total (as N)	Report	-	mg/L	Composite	Quarterly	Daily Maximum
00665	Phosphorus, total (as P)	Report	-	mg/L	Composite	Quarterly	Daily Maximum
50050	Flow	Report	-	Mgal/d	Continuous	Daily	Daily Maximum
50050	Flow	Report	-	Mgal/d	Continuous	Daily	Monthly Average
50060	Chlorine, total residual (TRC)	<=	1.0	mg/L	Grab	Daily	Instantaneous Maximum
51040	E. coli	<=	487	#/100mL	Grab	Daily	Daily Maximum
51040	E. coli	<=	126	#/100mL	Grab	Daily	Monthly

							Geometric Mean
TRP3B	IC25 Static Renewal 7 Day Chronic Ceriodaphnia	>=	1.6	%	Composite	Semiannual	Minimum
TRP6C	IC25 Static Renewal 7 Day Chronic Pimephales promelas	>=	1.6	%	Composite	Semiannual	Minimum
<b>Percent Removal from influent to Outfall 001 Season: All year</b>							
<b>Code</b>	<b>Parameter</b>	<b>Qualifier</b>	<b>Value</b>	<b>Unit</b>	<b>Sample Type</b>	<b>Monitoring Frequency</b>	<b>Statistical Base</b>
81010	BOD, 5-day, % removal	>=	40	%	Calculated	Daily	Daily Minimum
81010	BOD, 5-day, % removal	>=	85	%	Calculated	Daily	Monthly Average Minimum
81011	TSS, % removal	>=	85	%	Calculated	Daily	Monthly Average Minimum
81011	TSS, % removal	>=	40	%	Calculated	Daily	Daily Minimum
<b>Raw sewage influent sampling Season: All year</b>							
<b>Code</b>	<b>Parameter</b>	<b>Qualifier</b>	<b>Value</b>	<b>Unit</b>	<b>Sample Type</b>	<b>Monitoring Frequency</b>	<b>Statistical Base</b>
00530	Total Suspended Solids (TSS)	Report	-	mg/L	Composite	Daily	Monthly Average
00530	Total Suspended Solids (TSS)	Report	-	mg/L	Composite	Daily	Daily Maximum
50050	Flow	Report	-	Mgal/d	Continuous	Daily	Monthly Average
50050	Flow	Report	-	Mgal/d	Continuous	Daily	Daily Maximum
00310	BOD, 5-day, 20 C	Report	-	mg/L	Composite	Daily	Monthly Average
00310	BOD, 5-day, 20 C	Report	-	mg/L	Composite	Daily	Daily Maximum

<b>Bypasses and SSOs Season: All year</b>							
<b>Code</b>	<b>Parameter</b>	<b>Qualifier</b>	<b>Value</b>	<b>Unit</b>	<b>Sample Type</b>	<b>Monitoring Frequency</b>	<b>Statistical Base</b>
51929	Bypass of Treatment Facility	<=	-	occur/mo	Occurrences	Continuous	Monthly Total
51925	SSO, Dry Weather	<=	0	occur/mo	Occurrences	Continuous	Monthly Total
51926	SSO, Wet Weather	<=	0	occur/mo	Occurrences	Continuous	Monthly Total

Notes: See Part 2.3.3.a for the definition of overflow and Part 1.3.5.1 for reporting requirements.

See Part 1.2.3 for test procedures.

See Part 3.4 for biomonitoring test and reporting requirements. See next page for percent removal calculations.

Total residual chlorine (TRC) monitoring shall be applicable when chlorine, bromine, or any other oxidants are added. The acceptable methods for analysis of TRC are any methods specified in Title 40 CFR, Part 136 as amended. The method detection level (MDL) for TRC shall not exceed 0.05 mg/l unless the permittee demonstrates that its MDL is higher. The permittee shall retain the documentation that justifies the higher MDL and have it available for review upon request. In cases where the permit limit is less than the MDL, the reporting of TRC at less than the MDL shall be interpreted to constitute compliance with the permit.

The wastewater discharge must be disinfected to the extent that viable coliform organisms are effectively eliminated. The concentration of the *E. coli* group after disinfection shall not exceed 126 cfu per 100 ml as the geometric mean calculated on the actual number of samples collected and tested for *E. coli* within the required reporting period. The permittee may collect more samples than specified as the monitoring frequency. Samples may not be collected at intervals of less than 12 hours. For the purpose of determining the geometric mean, individual samples having an *E. coli* group concentration of less than one (1) per 100 ml shall be considered as having a concentration of one (1) per 100 ml. In addition, the concentration of the *E. coli* group in any individual sample shall not exceed a specified maximum amount. A maximum daily limit of 487 colonies per 100 ml applies to lakes and exceptional Tennessee waters. A maximum daily limit of 941 colonies per 100 ml applies to all other recreational waters.

There shall be no distinctly visible floating scum, oil or other matter contained in the wastewater discharge. The wastewater discharge must not cause an objectionable color contrast in the receiving stream.

The wastewater discharge shall not contain pollutants in quantities that will be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream.

Sludge or any other material removed by any treatment works must be disposed of in a manner that prevents its entrance into or pollution of any surface or subsurface waters. Additionally, the disposal of such sludge or other material must be in compliance with the Tennessee Solid Waste Disposal Act, TCA 68-31-101 et seq. and the Tennessee Hazardous Waste Management Act, TCA 68-46-101 et seq.

Nothing in this permit authorizes take for the purposes of a facility's compliance with the Endangered Species Act. (40 C.F.R. 125.98(b)(1)).

For the purpose of evaluating compliance with the permit limits established herein, where certain limits are below the State of Tennessee published required detection levels (RDLs) for any given effluent characteristics, the results of analyses below the RDL shall be reported as Below Detection Level (BDL), unless in specific cases other detection limits are demonstrated to be the best achievable because of the particular nature of the wastewater being analyzed.

## **1.2. MONITORING PROCEDURES**

### **1.2.1. Representative Sampling**

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to insure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than plus or minus 10% from the true discharge rates throughout the range of expected discharge volumes.

Samples and measurements taken in compliance with the monitoring requirements specified above shall be representative of the volume and nature of the monitored discharge, and shall be taken at the following location(s):

Influent samples must be collected after all waste streams being treated are completely mixed. Concentrations and percent removals reported on monthly Discharge Monitoring Reports (DMRs) must account for any significant BOD5 and TSS in flows returned to the process stream ahead of the influent sampler. The Division considers BOD5 and TSS amounts at or above 10% of the total influent loading (as determined by a long term average) to be significant. The permittee must maintain calculations that support the DMR data and have them available for viewing at the location where the facility's other laboratory records are kept

Effluent samples must be representative of the wastewater being discharged and collected prior to mixing with any other discharge or the receiving stream. This can be a different point for different parameters, but must be after all treatment for that parameter or all expected change:

- a. The chlorine residual must be measured after the chlorine contact chamber and any dechlorination. It may be to the advantage of the permittee to measure at the end of any long outfall lines.
- b. Samples for *E. coli* can be collected at any point between disinfection and the actual discharge.
- c. The dissolved oxygen can drop in the outfall line; therefore, D.O. measurements are required at the discharge end of outfall lines greater than one mile long. Systems with outfall lines less than one mile may measure dissolved oxygen as the wastewater leaves the treatment facility. For systems with dechlorination, dissolved oxygen must be measured after this step and as close to the end of the outfall line as possible.
- d. Total suspended solids and settleable solids can be collected at any point after the final clarifier.
- e. Biomonitoring tests (if required) shall be conducted on final effluent.

### **1.2.2. Sampling Frequency**

Where the permit requires sampling and monitoring of a particular effluent characteristic(s) at a frequency of less than once per day or daily, the permittee is precluded from marking the "No Discharge" block on the Discharge Monitoring Report if there has been any discharge from that



particular outfall during the period which coincides with the required monitoring frequency; i.e. if the required monitoring frequency is once per month or 1/month, the monitoring period is one month, and if the discharge occurs during only one day in that period then the permittee must sample on that day and report the results of analyses accordingly.

### **1.2.3. Test Procedures**

- a. Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304 (h) of the Clean Water Act (the "Act"), as amended, under which such procedures may be required.
- b. Unless otherwise noted in the permit, all pollutant parameters shall be determined according to methods prescribed in Title 40, CFR, Part 136, as amended, promulgated pursuant to Section 304 (h) of the Act.
- c. Composite samples must be proportioned by flow at time of sampling. Aliquots may be collected manually or automatically. The sample aliquots must be maintained at  $\leq 6$  degrees Celsius during the compositing period.
- d. In instances where permit limits established through implementation of applicable water criteria are below analytical capabilities, compliance with those limits will be determined using the detection limits described in the TN Rules, Chapter 0400-40-03-.05(8)
- e. All sampling for total mercury at the municipal wastewater plant (application, pretreatment, etc.) shall use Methods 1631, 245.7 or any additional method in 40 CFR 136 with a maximum detection limit of 5 ng/L. For test methods requiring collection of a grab sample, the analysis may be conducted on a set of grabs composited in the testing lab in compliance with the quality control procedures prescribed by the method for each grab sample. Samples must be collected at such time that the treatment plant effluent would be expected to include the most likely sources of mercury in the municipal system.

### **1.2.4. Recording of Results**

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- a. The exact place, date and time of sampling;
- b. The exact person(s) collecting samples;
- c. The dates and times the analyses were performed;
- d. The person(s) or laboratory that performed the analyses;
- e. The analytical techniques or methods used, and;
- f. The results of all required analyses.

### **1.2.5. Records Retention**

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation shall be retained for a minimum of three (3) years, or longer, if requested by the Division of Water Resources.

## **1.3. REPORTING**

### **1.3.1. Monitoring Results**

Monitoring results shall be recorded monthly and submitted monthly using NetDMR. Submittals shall be no later than 15 days after the completion of the reporting period. If NetDMR is not functioning, a completed DMR with an original signature shall be submitted to the following address:

**STATE OF TENNESSEE  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DIVISION OF WATER RESOURCES  
COMPLIANCE & ENFORCEMENT SECTION  
William R. Snodgrass - Tennessee Tower  
312 Rosa L. Parks Avenue, 11th Floor  
Nashville, Tennessee 37243-1102**

If NetDMR is not functioning, a copy of the completed and signed DMR shall be mailed to the Knoxville Environmental Field Office (EFO) at the following address:

**STATE OF TENNESSEE  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DIVISION OF WATER RESOURCES  
Knoxville Environmental Field Office  
3711 Middlebrook Pike  
Knoxville, Tennessee 37921**

In addition, any communication regarding compliance with the conditions of this permit must be sent to the two offices listed above.

The first DMR is due on the 15th of the month following permit effectiveness.

DMRs and any other information or report must be signed and certified by a responsible corporate officer as defined in 40 CFR 122.22, a general partner or proprietor, or a principal municipal executive officer or ranking elected official or his duly authorized representative. Such authorization must be submitted in writing and must explain the duties and responsibilities of the authorized representative.

For purposes of determining compliance with this permit, data provided to the division electronically is legally equivalent to data submitted on signed and certified DMR forms.

### **1.3.2. Additional Monitoring by Permittee**

If the permittee monitors any pollutant specifically limited by this permit more frequently than required at the location(s) designated, using approved analytical methods as specified herein, the results of such monitoring shall be included in the calculation and reporting of the values required in the DMR form. Such increased frequency shall also be indicated on the form.

### **1.3.3. Falsifying Results and/or Reports**

Knowingly making any false statement on any report required by this permit or falsifying any result may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Water Pollution Control Act, as amended, and in Section 69-3-115 of the Tennessee Water Quality Control Act.

### **1.3.4. Monthly Operating Report**

Monthly operating reports shall be submitted on standard forms to the appropriate Division of Water Resources Environmental Field Office in Jackson, Nashville, Chattanooga, Columbia, Cookeville, Memphis, Johnson City, or Knoxville. Reports shall be submitted by the 15th day of the month following data collection.

### **1.3.5. Bypass and Overflow Reporting**

#### **1.3.5.1. Report Requirements**

The facility will submit bypass and overflow reporting in accordance with the approved Reporting, Notification and Record-Keeping Program (RNRKP).

#### **1.3.5.2. Anticipated Bypass Notification**

If, because of unavoidable maintenance or construction, the permittee has need to create an in-plant bypass which would cause an effluent violation, the permittee must notify the division as soon as possible, but in any case, no later than 10 days prior to the date of the bypass.

### **1.3.6. Reporting Less Than Detection; Reporting Significant Figures**

A permit limit may be less than the accepted detection level. If the samples are below the detection level, then report "BDL" or "NODI =B" on the DMRs. The permittee must use the correct detection levels in all analytical testing required in the permit. The required detection levels are listed in the Rules of the Department of Environment and Conservation, Division of Water Resources, Chapter 0400-40-03-.05(8).

For example, if the limit is 0.02 mg/l with a detection level of 0.05 mg/l and detection is shown; 0.05 mg/l must be reported. In contrast, if nothing is detected reporting "BDL" or "NODI =B" is acceptable.

Reported results are to correspond to the number of significant figures (decimal places) set forth in the permit conditions. The permittee shall round values, if allowed by the method of sample analysis, using a uniform rounding convention adopted by the permittee.

#### **1.4. COMPLIANCE WITH SECTION 208**

The limits and conditions in this permit shall require compliance with an area-wide waste treatment plan (208 Water Quality Management Plan) where such approved plan is applicable.

#### **1.5. REOPENER CLAUSE**

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 307(a)(2) and 405(d)(2)(D) of the Clean Water Act, as amended, if the effluent standard, limitation or sludge disposal requirement so issued or approved:

- a. Contains different conditions or is otherwise more stringent than any condition in the permit;  
or
- b. Controls any pollutant or disposal method not addressed in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of the Act then applicable. The permit may also be reopened or revoked and reissued based on any assessment determination, waste load allocation, total maximum daily load development, or other document subject to public notice and appeal requirements under the Act.

#### **1.6. SCHEDULE OF COMPLIANCE**

Full compliance and operational levels shall be attained from the effective date of this permit.

### **2.0. GENERAL PERMIT REQUIREMENTS**

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#### **2.1. GENERAL PROVISIONS**

##### **2.1.1. Duty to Reapply**

Permittee is not authorized to discharge after the expiration date of this permit. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information and forms as are required to the Director of the Division of Water Resources (the "director") no later than 180 days prior to the expiration date. Such forms shall be properly signed and certified.

#### **2.1.2. Right of Entry**

The permittee shall allow the director, the Regional Administrator of the U.S. Environmental Protection Agency, or their authorized representatives, upon the presentation of credentials:

- a. To enter upon the permittee's premises where an effluent source is located or where records are required to be kept under the terms and conditions of this permit, and at reasonable times to copy these records;
- b. To inspect at reasonable times any monitoring equipment or method or any collection, treatment, pollution management, or discharge facilities required under this permit; and
- c. To sample at reasonable times any discharge of pollutants.

#### **2.1.3. Availability of Reports**

Except for data determined to be confidential under Section 308 of the Federal Water Pollution Control Act, as amended, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division of Water Resources. As required by the Federal Act, effluent data shall not be considered confidential.

#### **2.1.4. Proper Operation and Maintenance**

- a. The permittee shall at all times properly operate and maintain all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory and process controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. Backup continuous pH and flow monitoring equipment are not required.
- b. Dilution water shall not be added to comply with effluent requirements to achieve BCT, BPT, BAT and or other technology based effluent limitations such as those in State of Tennessee Rule 0400-40-05-.09.

#### **2.1.5. Treatment Facility Failure (Industrial Sources)**

The permittee, in order to maintain compliance with this permit, shall control production, all discharges, or both, upon reduction, loss, or failure of the treatment facility, until the facility is restored or an alternative method of treatment is provided. This requirement applies in such situations as the reduction, loss, or failure of the primary source of power.

#### **2.1.6. Property Rights**

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations.

#### **2.1.7. Severability**

The provisions of this permit are severable. If any provision of this permit due to any circumstance, is held invalid, then the application of such provision to other circumstances and to the remainder of this permit shall not be affected thereby.

#### **2.1.8. Other Information**

If the permittee becomes aware of failure to submit any relevant facts in a permit application, or of submission of incorrect information in a permit application or in any report to the director, then the permittee shall promptly submit such facts or information.

### **2.2. CHANGES AFFECTING THE PERMIT**

#### **2.2.1. Planned Changes**

The permittee shall give notice to the director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

- a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
- b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants, which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).

#### **2.2.2. Permit Modification, Revocation, or Termination**

- a. This permit may be modified, revoked and reissued, or terminated for cause as described in 40 CFR 122.62 and 122.64, Federal Register, Volume 49, No. 188 (Wednesday, September 26, 1984), as amended.
- b. The permittee shall furnish to the director, within a reasonable time, any information which the director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the director, upon request, copies of records required to be kept by this permit.
- c. If any applicable effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established for any

toxic pollutant under Section 307(a) of the Federal Water Pollution Control Act, as amended, the director shall modify or revoke and reissue the permit to conform to the prohibition or to the effluent standard, providing that the effluent standard is more stringent than the limitation in the permit on the toxic pollutant. The permittee shall comply with these effluent standards or prohibitions within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified or revoked and reissued to incorporate the requirement.

- d. The filing of a request by the permittee for a modification, revocation, reissuance, termination, or notification of planned changes or anticipated noncompliance does not halt any permit condition.

### **2.2.3. Change of Ownership**

This permit may be transferred to another party (provided there are neither modifications to the facility or its operations, nor any other changes which might affect the permit limits and conditions contained in the permit) by the permittee if:

- a. The permittee notifies the director of the proposed transfer at least 30 days in advance of the proposed transfer date;
- b. The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage, and liability between them; and
- c. The director, within 30 days, does not notify the current permittee and the new permittee of his intent to modify, revoke or reissue, or terminate the permit and to require that a new application be filed rather than agreeing to the transfer of the permit.

Pursuant to the requirements of 40 CFR 122.61, concerning transfer of ownership, the permittee must provide the following information to the division in their formal notice of intent to transfer ownership: 1) the NPDES permit number of the subject permit; 2) the effective date of the proposed transfer; 3) the name and address of the transferor; 4) the name and address of the transferee; 5) the names of the responsible parties for both the transferor and transferee; 6) a statement that the transferee assumes responsibility for the subject NPDES permit; 7) a statement that the transferor relinquishes responsibility for the subject NPDES permit; 8) the signatures of the responsible parties for both the transferor and transferee pursuant to the requirements of 40 CFR 122.22(a), "Signatories to permit applications"; and, 9) a statement regarding any proposed modifications to the facility, its operations, or any other changes which might affect the permit limits and conditions contained in the permit.

### **2.2.4. Change of Mailing Address**

The permittee shall promptly provide to the director written notice of any change of mailing address. In the absence of such notice the original address of the permittee will be assumed to be correct.

## **2.3. NONCOMPLIANCE**

### **2.3.1. Effect of Noncompliance**

All discharges shall be consistent with the terms and conditions of this permit. Any permit noncompliance constitutes a violation of applicable state and federal laws and is grounds for enforcement action, permit termination, permit modification, or denial of permit reissuance.

### **2.3.2. Reporting of Noncompliance**

#### **a. 24-Hour Reporting**

In the case of any noncompliance which could cause a threat to public drinking supplies, or any other discharge which could constitute a threat to human health or the environment, the required notice of non-compliance shall be provided to the Division of Water Resources in the appropriate Environmental Field Office within 24-hours from the time the permittee becomes aware of the circumstances. (The Environmental Field Office should be contacted for names and phone numbers of environmental response team).

A written submission must be provided within five days of the time the permittee becomes aware of the circumstances unless the director on a case-by-case basis waives this requirement. The permittee shall provide the director with the following information:

- i. A description of the discharge and cause of noncompliance;
- ii. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and
- iii. The steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

#### **b. Scheduled Reporting**

For instances of noncompliance which are not reported under subparagraph 2.3.2.a above, the permittee shall report the noncompliance on the Discharge Monitoring Report. The report shall contain all information concerning the steps taken, or planned, to reduce, eliminate, and prevent recurrence of the violation and the anticipated time the violation is expected to continue.

### **2.3.3. Overflow**

- a. "Overflow" means any release of sewage from any portion of the collection, transmission, or treatment system other than through permitted outfalls.
- b. Overflows are prohibited.



- c. The permittee shall operate the collection system so as to avoid overflows. **New or additional flows shall only be allowed in accordance with Knoxville Utilities Board's approved Capacity Assurance Plan (CAP).**

#### **2.3.4. Upset**

- a. "**Upset**" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
- b. An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence that:
  - i. An upset occurred and that the permittee can identify the cause(s) of the upset;
  - ii. The permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;
  - iii. The permittee submitted information required under "Reporting of Noncompliance" within 24-hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days); and
  - iv. The permittee complied with any remedial measures required under "Adverse Impact."

#### **2.3.5. Adverse Impact**

The permittee shall take all reasonable steps to minimize any adverse impact to the waters of Tennessee resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

### 2.3.6. Bypass

- a. "**Bypass**" is the intentional diversion of waste streams from any portion of a treatment facility. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
- b. Bypasses are prohibited unless all of the following 3 conditions are met:
  - i. The bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;
  - ii. There are no feasible alternatives to bypass, such as the construction and use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass, which occurred during normal periods of equipment downtime or preventative maintenance;
  - iii. The permittee submits notice of an unanticipated bypass to the Division of Water Resources in the appropriate Environmental Field Office within 24 hours of becoming aware of the bypass (if this information is provided orally, a written submission must be provided within five days). When the need for the bypass is foreseeable, prior notification shall be submitted to the director, if possible, at least 10 days before the date of the bypass.
- c. Bypasses not exceeding permit limitations are allowed **only** if the bypass is necessary for essential maintenance to assure efficient operation. All other bypasses are prohibited. Allowable bypasses not exceeding limitations are not subject to the reporting requirements of 2.3.6.b.iii, above.

### 2.3.7. Washout

- a. For domestic wastewater plants only, a "washout" shall be defined as loss of Mixed Liquor Suspended Solids (MLSS) of 30.00% or more. This refers to the MLSS in the aeration basin(s) only. This does not include MLSS decrease due to solids wasting to the sludge disposal system. A washout can be caused by improper operation or from peak flows due to infiltration and inflow.
- b. A washout is prohibited under all but those conditions provided below. If a washout occurs the permittee must report the incident to the Division of Water Pollution Control in the Environmental Field Office within 24 hours by telephone. A written submission must be provided within 5 days. The washout must be noted on the discharge monitoring report. Each day of a washout represents a separate permit violation except where the washout meets all of the following conditions:
  - 1) The suspended solids concentration, as measured during the same day as the washout, does not exceed the daily maximum permit limitation;

- 2) The daily maximum amount of suspended solids in the effluent, measured during the same day of the washout, does not exceed the amount that would occur if the plant flow was at design capacity and the concentration of TSS was at the maximum effluent limit (i.e.,  $44 \text{ mgd} \times 45 \text{ mg/l} \times 8.34 = 16,513 \text{ lbs/day}$ ); and,
- 3) The percent removal of TSS as measured on the same day as the washout is equal to or greater than 40 percent.

## **2.4. LIABILITIES**

### **2.4.1. Civil and Criminal Liability**

Except as provided in permit conditions for "***Bypassing***," "***Overflow***," and "***Upset***," nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Notwithstanding this permit, the permittee shall remain liable for any damages sustained by the State of Tennessee, including but not limited to fish kills and losses of aquatic life and/or wildlife, as a result of the discharge of wastewater to any surface or subsurface waters. Additionally, notwithstanding this Permit, it shall be the responsibility of the permittee to conduct its wastewater treatment and/or discharge activities in a manner such that public or private nuisances or health hazards will not be created.

### **2.4.2. Liability under State Law**

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or the Federal Water Pollution Control Act, as amended.

### **3.0. PERMIT SPECIFIC REQUIREMENTS**

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#### **3.1. CERTIFIED OPERATOR**

The waste treatment facilities shall be operated under the supervision of a certified wastewater treatment operator and the collection system shall be operated under the supervision of a certified collection system operator in accordance with the Water Environmental Health Act of 1984.

#### **3.2. POTW PRETREATMENT PROGRAM GENERAL PROVISIONS**

As an update of information previously submitted to the division, the permittee will undertake the following activity.

- a. The permittee has been delegated the primary responsibility and therefore becomes the "control authority" for enforcing the 40 CFR 403 General Pretreatment Regulations. Where multiple plants are concerned the permittee is responsible for the Pretreatment Program for all plants within its jurisdiction. The permittee shall implement and enforce the Industrial Pretreatment Program in accordance with Section 403(b) (8) of the Clean Water Act, the Federal Pretreatment Regulations 40 CFR 403, Tennessee Water Quality Control Act Part 69-3-123 through 69-3-128, and the legal authorities, policies, procedures, and financial provisions contained in its approved Pretreatment Program, except to the extent this permit imposed stricter requirements. Such implementation shall require but not limit the permittee to do the following:
  - i. Carry out inspection, surveillance, and monitoring procedures which will determine, independent of information supplied by the industrial user (IU), whether the IU is in compliance with the pretreatment standards;
  - ii. Require development, as necessary, of compliance schedules for each IU for the installation of control technologies to meet applicable pretreatment standards;
  - iii. Require all industrial users to comply with all applicable monitoring and reporting requirements outlined in the approved pretreatment program and IU permit;
  - iv. Maintain and update, as necessary, records identifying the nature and character of industrial user discharges, and retain such records for a minimum of three (3) years;
  - v. Obtain appropriate remedies for noncompliance by an IU with any pretreatment standard and/or requirement;

- vi. Publish annually, pursuant to 40 CFR 403.8 (f) (2) (viii), a list of industrial users that have significantly violated pretreatment requirements and standards during the previous twelve-month period.
- vii. Maintain an adequate revenue structure for continued operation of the pretreatment program.
- viii. Update its Industrial Waste Survey at least once every five years. **Results of this update shall be submitted to the Division of Water Resources, Pretreatment Section within 120 days of the effective date of this permit,** unless such a survey has been submitted within 3 years of the effective date.
- ix. Submit a written technical evaluation of the need to revise local limits within 120 days of the effective date of this permit to the state pretreatment program coordinator. The evaluation shall include the most recent pass-through limits proposed by the division. The technical evaluation shall be based on practical and specialized knowledge of the local program and not be limited by a specified written format.
- b. The permittee shall enforce 40 CFR 403.5, "prohibited discharges". **Pollutants introduced into the POTW by a non-domestic source shall not cause pass through or interference as defined in 40 CFR Part 403.3.** These general prohibitions and the specific prohibitions in this section apply to all non-domestic sources introducing pollutants into the POTW whether the source is subject to other National Pretreatment Standards or any state or local pretreatment requirements.

Specific prohibitions: under no circumstances shall the permittee allow introduction of the following wastes in the waste treatment system:

- i. Pollutants which create a fire or explosion hazard in the POTW;
- ii. Pollutants which will cause corrosive structural damage to the treatment works, but in no case discharges with pH less than 5.0 unless the system is specifically designed to accept such discharges.
- iii. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the treatment system resulting in interference.
- iv. Any pollutant, including oxygen-demanding pollutants (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the treatment works.
- v. Heat in amounts which will inhibit biological activity in the treatment works resulting in interference, but in no case heat in such quantities that the temperature at the treatment works exceeds 40°C (104°F) unless the works are designed to accommodate such heat.

- vi. Any priority pollutant in amounts that will contaminate the treatment works sludge.
  - vii. Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
  - viii. Pollutants which result in the presence of toxic gases, vapors or fumes within the POTW in a quantity that may cause acute worker health and safety problems;
  - ix. Any trucked or hauled pollutants except at discharge points designated by the POTW.
- c. The permittee shall notify the Tennessee Division of Water Resources of any of the following changes in user discharge to the system no later than 30 days prior to change of discharge:
- i. New introductions into such works of pollutants from any source which would be a new source as defined in Section 306 of the Act if such source were discharging pollutants.
  - ii. New introductions of pollutants into such works from a source which would be subject to Section 301 of the "Federal Water Quality Act as Amended" if it were discharging such pollutants.
  - iii. A substantial change in volume or character of pollutants being introduced into such works by a source already discharging pollutants into such works at the time the permit is issued.

This notice will include information on the quantity and quality of the wastewater introduced by the new source into the publicly owned treatment works, and on any anticipated impact on the effluent discharged from such works. If this discharge necessitates a revision of the current NPDES permit or pass-through guidelines, discharge by this source is prohibited until the Tennessee Division of Water Resources gives final authorization.

d. Reporting Requirements

The permittee shall provide a semiannual report briefly describing the permittee's pretreatment program activities over the previous six-month period. Reporting periods shall end on the last day of the months of March and September. The report shall be submitted to the Division of Water Resources, Central Office and a copy to the appropriate Environmental Field Office no later than the 28th day of the month following each reporting period. For control authorities with multiple STPs, one report should be submitted with a separate Form 1 for each STP. Each report shall conform to the format set forth in the State POTW Pretreatment Semiannual Report Package which contains information regarding:

- i. An updated listing of the permittee's industrial users.

- ii. Results of sampling of the influent and effluent of the wastewater treatment plant. At least once each reporting period, the permittee shall analyze the wastewater treatment plant influent and effluent for the following pollutants, using the prescribed sampling procedures:

Pollutant	Sample Type
chromium, trivalent	24-hour composite
chromium, hexavalent	Per method requirements <sup>1</sup>
copper	24-hour composite
lead	24-hour composite
nickel	24-hour composite
zinc	24-hour composite
cadmium	24-hour composite
mercury	Per method requirements
silver	24-hour composite
total phenols	grab
cyanide	grab

If any particular pollutant is analyzed more frequently than is required, the permittee shall report the maximum and average values on the semiannual report. All upsets, interferences, and pass-through violations must also be reported on the semiannual report, the actions that were taken to determine the causes of the incidents and the steps that have been taken to prevent the incidents from recurring.

At least once during the term of this permit, the permittee shall analyze the effluent from the STP (and report the results in the next regularly scheduled report) for the following pollutants:

chromium III	cyanide	phthalates, sum of the following: bis (2-ethylhexyl) phthalate butyl benzylphthalate di-n-butylphthalate diethyl phthalate
chromium VI	silver	
copper	benzene	
lead	carbon tetrachloride	
nickel	chloroform	
zinc	ethylbenzene	1,2 trans-dichloroethylene
cadmium	methylene chloride	tetrachloroethylene
mercury	naphthalene	toluene
phenols, total	1,1,1 trichloroethane	trichloroethylene

<sup>1</sup> When a composite sample would compromise sample integrity refer to 40 CFR Part 136.3 Table II including footnotes.

- iii. Compliance with categorical and local standards, and review of industrial compliance, which includes a summary of the compliance status for all permitted industries. Also included is information on the number and type of major violations of pretreatment regulations, and the actions taken by the POTW to obtain compliance. The effluent from all significant industrial users must be analyzed for the appropriate pollutants at least once every 12 months.
- iv. A list of industries in significant non-compliance as published in local newspapers in accordance with the requirements set forth in 40 CFR 403.8(f)(2)(viii).
- v. A description of all substantive changes made to the permittee's pretreatment program. Any such changes shall receive prior approval. Substantive changes include, but are not limited to, any change in any ordinance, major modification in the program's administrative structure, local limits, or a change in the method of funding the program.
- vi. Summary of permittee's industrial user inspections, which includes information on the number and type of industry inspected. All significant industrial users must be inspected at least once per year.

### **3.3. BIOSOLIDS MANAGEMENT PRACTICES**

All sludge and/or biosolids use or disposal must comply with 40 CFR 503 et seq. Biosolids shall be sampled and analyzed at a frequency dependent on the amount used annually.

- a. Reopener: If an applicable "acceptable management practice" or numerical limitation for pollutants in sewage sludge promulgated under Section 405(d)(2) of the Clean Water Act, as amended by the Water Quality Act of 1987, is more stringent than the sludge pollutant limit or acceptable management practice in this permit, or controls a pollutant not limited in this permit, this permit shall be promptly modified or revoked and reissued to conform to the requirements promulgated under Section 405(d)(2). The permittee shall comply with the limitations by no later than the compliance deadline specified in the applicable regulations as required by Section 405(d)(2) of the Clean Water Act.
- b. The permittee will follow the Knoxville Utilities Board Biosolids Management Plan, including disposal sites, sludge disposal practices, and sampling program, as approved by the Division. Changes proposed to the Plan must also be submitted in writing to the Division for approval. The Division may elect to rescind program approval at any time for good cause. If land application activities are suspended permanently and sludge disposal moves to a municipal solid waste landfill, the permittee shall contact the local Division of Solid Waste Management office address for other permitting and approvals (see table below):



Division of Solid Waste Management			
Office	Location	Zip Code	Phone No.
Chattanooga	1301 Riverfront Parkway, Suite 206	37402	(423) 634-5745
Jackson	1625 Hollywood Drive	38305	(731) 512-1300
Cookeville	1221 South Willow Avenue	38506	(931) 520-6688
Columbia	1421 Hampshire Pike	38401	(931) 380-3371
Johnson City	2305 Silverdale Road	37601	(423) 854-5400
Knoxville	3711 Middlebrook Pike	37921	(865) 594-6035
Memphis	8383 Wolf Lake Drive, Bartlett	38133	(901) 371-3000
Nashville	711 R.S. Gass Boulevard	37216	(615) 687-7000

### 3.4. BIOMONITORING REQUIREMENTS, CHRONIC

The permittee shall conduct a 3-Brood *Ceriodaphnia dubia* Survival and Reproduction Test and a 7-Day Fathead Minnow (*Pimephales promelas*) Larval Survival and Growth Test on samples of final effluent from Outfall 001.

The measured endpoint for toxicity will be the inhibition concentration causing 25% reduction in survival, reproduction and growth ( $IC_{25}$ ) of the test organisms. The  $IC_{25}$  shall be determined based on a 25% reduction as compared to the controls, and as derived from linear interpolation. The average reproduction and growth responses will be determined based on the number of *Ceriodaphnia dubia* or *Pimephales promelas* larvae used to initiate the test.

Test shall be conducted and its results reported based on appropriate replicates of a total of five serial dilutions and a control, using the percent effluent dilutions as presented in the following table:

Serial Dilutions for Whole Effluent Toxicity (WET) Testing					
4 X PL	2 X PL	Permit Limit (PL)	0.50 X PL	0.25 X PL	Control
% effluent					
6.4	3.2	1.6	0.8	0.4	0

The dilution/control water used will be moderately hard water as described in [Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms](#), EPA-821-R-02-013 (or the most current edition). A chronic standard reference toxicant quality assurance test shall be conducted with each species used in the toxicity tests and the results submitted with the discharge monitoring report. **Additionally, the analysis of this multi-concentration test shall include review of the concentration-response relationship to ensure that calculated test results are interpreted appropriately.**

Toxicity will be demonstrated if the  $IC_{25}$  is less than or equal to the permit limit indicated for each outfall in the above table(s). Toxicity demonstrated by the tests specified herein constitutes a violation of this permit.

All tests will be conducted using a minimum of three 24-hour flow-proportionate composite samples of final effluent collected on days 1, 3 and 5. If, in any control more than 20% of the test organisms die in 7 days, the test (control and effluent) is considered invalid and the test shall be repeated within two (2) weeks. Furthermore, if the results do not meet the acceptability criteria in [Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms](#), EPA-821-R-02-013 (or the most current edition), or if the required concentration-response review fails to yield a valid relationship per guidance contained in [Method Guidance and Recommendations for Whole Effluent Toxicity \(WET\) Testing](#), EPA-821-B-00-004 (or the most current edition), that test shall be repeated. Any test initiated but terminated before completion must also be reported along with a complete explanation for the termination.

**The toxicity tests specified herein shall be conducted semiannually (2/year) for Outfall 001 and begin no later than 180 days from the effective date of this permit.**

**In the event of a test failure**, the permittee must start a follow-up test within 2 weeks and submit results from a follow-up test within 30 days from obtaining initial WET testing results. The follow-up test must be conducted using the same serial dilutions as presented in the corresponding table(s) above. **The follow-up test will not negate an initial failed test. In addition, the failure of a follow-up test will constitute a separate permit violation.**

In the event of 2 consecutive test failures or 3 test failures within a 12-month period for the same outfall, the permittee must initiate a Toxicity Identification Evaluation/Toxicity Reduction Evaluation (TIE/TRE) study within 30 days and so notify the division by letter. This notification shall include a schedule of activities for the initial investigation of that outfall. **During the term of the TIE/TRE study, the frequency of biomonitoring shall be once every three months.** Additionally, the permittee shall submit progress reports once every three months throughout the term of the TIE/TRE study. The toxicity must be reduced to allowable limits for that outfall within 2 years of initiation of the TIE/TRE study. Subsequent to the results obtained from the TIE/TRE studies, the permittee may request an extension of the TIE/TRE study period if necessary to conduct further analyses. The final determination of any extension period will be made at the discretion of the division.

The TIE/TRE study may be terminated at any time upon the completion and submission of 2 consecutive tests (for the same outfall) demonstrating compliance. Following the completion of TIE/TRE study, the frequency of monitoring will return to a regular schedule, as defined previously in this section as well in Part I of the permit. **During the course of the TIE/TRE study, the permittee will continue to conduct toxicity testing of the outfall being investigated at the frequency of once every three months but will not be required to perform follow-up tests for that outfall during the period of TIE/TRE study.**

Test procedures, quality assurance practices, determinations of effluent survival/reproduction and survival/growth values, and report formats will be made in accordance with [Short-Term Methods for Estimating the Chronic Toxicity of Effluents](#)

[and Receiving Water to Freshwater Organisms](#), EPA-821-R-02-013, or the most current edition.

Results of all tests, reference toxicant information, copies of raw data sheets, statistical analysis and chemical analyses shall be compiled in a report. The report will be written in accordance with [Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms](#), EPA-821-R-02-013, or the most current edition.

Two copies of biomonitoring reports (including follow-up reports) shall be submitted to the division. One copy of the report shall be submitted along with the discharge monitoring report (DMR). The second copy shall be submitted to the local Division of Water Resources office address (see table below):

Division of Water Resources			
Office	Location	Zip Code	Phone No.
Chattanooga	1301 Riverfront Pkwy., Suite 206	37402	(423) 634-5745
Jackson	1625 Hollywood Drive	38305	(731) 512-1300
Cookeville	1221 South Willow Avenue	38506	(931) 520-6688
Columbia	1421 Hampshire Pike	38401	(931) 380-3371
Johnson City	2305 Silverdale Road	37601	(423) 854-5400
Knoxville	3711 Middlebrook Pike	37921	(865) 594-6035
Memphis	8383 Wolf Lake Drive, Bartlett	38133	(901) 371-3000
Nashville	711 R.S. Gass Boulevard	37216	(615) 687-7000

### 3.5. PLACEMENT OF SIGNS

Within sixty (60) days of the effective date of this permit, the permittee shall place and maintain a sign at each overflow point in the collection system. For the purposes of this requirement, any point that has had a total of five (5) or more overflows in the last year must be so posted. The sign(s) should be clearly visible to the public from the bank and the receiving stream. The minimum sign size should be two feet by two feet (2' x 2') with one-inch (1") letters. The sign should be made of durable material and have a white background with black letters.

The sign(s) are to provide notice to the public as to the nature of the discharge and, in the case of the permitted outfalls, that the discharge is regulated by the Tennessee Department of Environment and Conservation, Division of Water Resources. The following is given as an example of the minimal amount of information that must be included on the sign:

**Permitted CSO or unpermitted overflow point:**

**UNTREATED WASTEWATER DISCHARGE POINT  
KUB - Fourth Creek WWTP  
(865) 594-7534  
NPDES Permit NO. TN0023574  
TENNESSEE DIVISION OF WATER RESOURCES  
1-888-891-8332 ENVIRONMENTAL FIELD OFFICE - Knoxville**

**NPDES Permitted Municipal/Sanitary Outfall:**

**TREATED MUNICIPAL/SANITARY WASTEWATER  
KUB - Fourth Creek WWTP  
(865) 594-7534  
NPDES Permit NO. TN0023574  
TENNESSEE DIVISION OF WATER RESOURCES  
1-888-891-8332 ENVIRONMENTAL FIELD OFFICE - Knoxville**

No later than sixty (60) days from the effective date of this permit, the permittee shall have the above sign(s) on display in the location specified.

**3.6. ANTIDegradation**

Pursuant to the Rules of the Tennessee Department of Environment and Conservation, Chapter 0400-40-03-.06, titled "Tennessee Antidegradation Statement," which prohibits the degradation of exceptional Tennessee waters and the increased discharges of substances that cause or contribute to impairment, the permittee shall further be required, pursuant to the terms and conditions of this permit, to comply with the effluent limitations and schedules of compliance required to implement applicable water quality standards, to comply with a State Water Quality Plan or other state or federal laws or regulations, or where practicable, to comply with a standard permitting no discharge of pollutants.

## 4.0. DEFINITIONS AND ACRONYMS

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### 4.1. DEFINITIONS

**"Biosolids"** are treated sewage sludge that have contaminant concentrations less than or equal to the contaminant concentrations listed in Table 1 of subparagraph (3)(b) of Rule 0400-40-15-.02, meet any one of the ten vector attraction reduction options listed in part (4)(b)1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 of Rule 0400-40-15-.04, and meet either one of the six pathogen reduction alternatives for Class A listed in part (3)(a)3, 4, 5, 6, 7, or 8, or one of the three pathogen reduction alternatives for Class B listed in part (3)(b)2, 3, or 4 of Rule 0400- 40-15-.04.

A **"bypass"** is defined as the intentional diversion of waste streams from any portion of a treatment facility.

A **"calendar day"** is defined as the 24-hour period from midnight to midnight or any other 24-hour period that reasonably approximates the midnight to midnight time period.

A **"composite sample"** is a combination of not less than 8 influent or effluent portions, of at least 100 ml, collected over a 24-hour period. Under certain circumstances a lesser time period may be allowed, but in no case, less than 8 hours.

The **"daily maximum concentration"** is a limitation on the average concentration in units of mass per volume (e.g. milligrams per liter), of the discharge during any calendar day. When a proportional-to-flow composite sampling device is used, the daily concentration is the concentration of that 24-hour composite; when other sampling means are used, the daily concentration is the arithmetic mean of the concentrations of equal volume samples collected during any calendar day or sampling period.

**"Discharge"** or "discharge of a pollutant" refers to the addition of pollutants to waters from a source.

A **"dry weather overflow"** is a type of sanitary sewer overflow and is defined as one day or any portion of a day in which unpermitted discharge of wastewater from the collection or treatment system other than through the permitted outfall occurs and is not directly related to a rainfall event. Discharges from more than one point within a 24-hour period shall be counted as separate overflows.

**"Degradation"** means the alteration of the properties of waters by the addition of pollutants, withdrawal of water, or removal of habitat, except those alterations of a short duration.

**“De Minimis”** - Degradation of a small magnitude, as provided in this paragraph.

(a) Discharges and withdrawals

1. Subject to the limitation in part 3 of this subparagraph, a single discharge other than those from new domestic wastewater sources will be considered de minimis if it uses less than five percent of the available assimilative capacity for the substance being discharged.
2. Subject to the limitation in part 3 of this subparagraph, a single water withdrawal will be considered de minimis if it removes less than five percent of the 7Q10 flow of the stream.
3. If more than one activity described in part 1 or 2 of this subparagraph has been authorized in a segment and the total of the authorized and proposed impacts uses no more than 10% of the assimilative capacity, or 7Q10 low flow, they are presumed to be de minimis. Where the total of the authorized and proposed impacts uses 10% of the assimilative capacity, or 7Q10 low flow, additional degradation may only be treated as de minimis if the Division finds on a scientific basis that the additional degradation has an insignificant effect on the resource.

(b) Habitat alterations authorized by an Aquatic Resource Alteration Permit (ARAP) are de minimis if the Division finds that the impacts, individually and cumulatively are offset by impact minimization and/or in-system mitigation, provided however, in ONRWs the mitigation must occur within the ONRW.

An **“ecoregion”** is a relatively homogeneous area defined by similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables.

The **“geometric mean”** of any set of values is the  $n^{\text{th}}$  root of the product of the individual values where “n” is equal to the number of individual values. The geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For the purposes of calculating the geometric mean, values of zero (0) shall be considered to be one (1).

A **“grab sample”** is a single influent or effluent sample collected at a particular time.

The **“instantaneous maximum concentration”** is a limitation on the concentration, in milligrams per liter, of any pollutant contained in the wastewater discharge determined from a grab sample taken from the discharge at any point in time.

The **“instantaneous minimum concentration”** is the minimum allowable concentration, in milligrams per liter, of a pollutant parameter contained in the wastewater discharge determined from a grab sample taken from the discharge at any point in time.

The "**monthly average amount**", shall be determined by the summation of all the measured daily discharges by weight divided by the number of days during the calendar month when the measurements were made.

The "**monthly average concentration**", other than for *E. coli* bacteria, is the arithmetic mean of all the composite or grab samples collected in a one-calendar month period.

A "**one week period**" (or "**calendar-week**") is defined as the period from Sunday through Saturday. For reporting purposes, a calendar week that contains a change of month shall be considered part of the latter month.

"**Pollutant**" means sewage, industrial wastes, or other wastes.

A "**quarter**" is defined as any one of the following three-month periods: January 1 through March 31, April 1 through June 30, July 1 through September 30, and/or October 1 through December 31.

A "**rainfall event**" is defined as any occurrence of rain, preceded by 10 hours without precipitation that results in an accumulation of 0.01 inches or more. Instances of rainfall occurring within 10 hours of each other will be considered a single rainfall event.

A "**rationale**" (or "fact sheet") is a document that is prepared when drafting an NPDES permit or permit action. It provides the technical, regulatory and administrative basis for an agency's permit decision.

A "**reference site**" means least impacted waters within an ecoregion that have been monitored to establish a baseline to which alterations of other waters can be compared.

A "**reference condition**" is a parameter-specific set of data from regional reference sites that establish the statistical range of values for that particular substance at least-impacted streams.

A "**sanitary sewer overflow (SSO)**" shall mean an overflow, spill, or release of wastewater from the WCTS, including: (a) all Unpermitted Discharges; (b) overflows, spills, or releases of wastewater that may not have reached waters of the United States or the State; and (c) all Building Backups

"**Sewage**" means water-carried waste or discharges from human beings or animals, from residences, public or private buildings, or industrial establishments, or boats, together with such other wastes and ground, surface, storm, or other water as may be present.

"**Severe property damage**" when used to consider the allowance of a bypass or SSO means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence

of a bypass or SSO. Severe property damage does not mean economic loss caused by delays in production.

**“Sewerage system”** means the conduits, sewers, and all devices and appurtenances by means of which sewage and other waste is collected, pumped, treated, or disposed.

**“Sludge”** or **“sewage sludge”** is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works.

A **“subcoregion”** is a smaller, more homogenous area that has been delineated within an ecoregion.

**“Upset”** means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

**“washout”** – refer to section 2.3.7.

**“Waters”** means any and all water, public or private, on or beneath the surface of the ground, which are contained within, flow through, or border upon Tennessee or any portion thereof except those bodies of water confined to and retained within the limits of private property in single ownership which do not combine or effect a junction with natural surface or underground waters.

The **“weekly average amount”**, shall be determined by the summation of all the measured daily discharges by weight divided by the number of days during the calendar week when the measurements were made.

The **“weekly average concentration”**, is the arithmetic mean of all the composite samples collected in a one-week period. The permittee must report the highest weekly average in the one-month period.

## 4.2. ACRONYMS AND ABBREVIATIONS

1Q10 – 1-day minimum, 10-year recurrence interval

30Q20 – 30-day minimum, 20-year recurrence interval

7Q10 – 7-day minimum, 10-year recurrence interval



BAT – best available technology economically achievable  
BCT – best conventional pollutant control technology  
BDL – below detection level  
BOD<sub>5</sub> – five day biochemical oxygen demand  
BPT – best practicable control technology currently available  
CBOD<sub>5</sub> – five day carbonaceous biochemical oxygen demand  
CEI – compliance evaluation inspection  
CFR – code of federal regulations  
CFS – cubic feet per second  
CFU – colony forming units  
CIU – categorical industrial user  
CSO – combined sewer overflow  
DMR – discharge monitoring report  
D.O. – dissolved oxygen  
*E. coli* – *Escherichia coli*  
EFO – environmental field office  
LB(lb) - pound  
IC<sub>25</sub> – inhibition concentration causing 25% reduction in survival, reproduction and growth of the test organisms  
IU – industrial user  
IWS – industrial waste survey  
LC<sub>50</sub> – acute test causing 50% lethality  
MDL – method detection level  
MGD – million gallons per day  
MG/L(mg/l) – milligrams per liter  
ML – minimum level of quantification  
ml – milliliter  
MLSS – mixed liquor suspended solids  
MOR – monthly operating report  
NODI – no discharge  
NPDES – national pollutant discharge elimination system  
PL – permit limit  
POTW – publicly owned treatment works  
RDL – required detection limit

SAR – semi-annual [pretreatment program] report

SIU – significant industrial user

SSO – sanitary sewer overflow

STP – sewage treatment plant

TCA – Tennessee code annotated

TDEC – Tennessee Department of Environment and Conservation

TIE/TRE – toxicity identification evaluation/toxicity reduction evaluation

TMDL – total maximum daily load

TRC – total residual chlorine

TSS – total suspended solids

WQBEL – water quality based effluent limit

WWTP – Wastewater Treatment Plant

## 5.0. RATIONALE

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**KUB - Fourth Creek WWTP**  
**NPDES Permit No. TN0023574**  
**Date: 2/28/2018**  
**Permit Writer: David Matthews<sup>1</sup>**

### 1.1.1. FACILITY INFORMATION

<p><b>KUB - Fourth Creek WWTP</b> Mr. Derwin Hagood P.E.- Senior Vice President, Operations Knoxville, Knox County, Tennessee (865) 594-7534 Treatment Plant Average Design Flow: <b>10.8 MGD</b> Percentage Industrial Flow: <b>1.2%</b><sup>2</sup> Treatment Description: <b>Treatment of municipal sewage via coarse screening, grit removal, grease removal, primary sedimentation, high rate clarification (for excess flow), activated sludge, secondary clarification, chlorination, and de-chlorination. Sludge is pumped to Kuwahee STP for treatment and disposal.</b> Certified Operator Grades: WWT: <b>4</b>; CS: <b>2</b>; Date Rated: <b>01/16/18</b></p>
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### 1.1.2. RECEIVING STREAM INFORMATION

<p><b>Tennessee River Mile 640</b> Watershed Group: <b>Ft. Loudoun/Little River</b> Hydrocode: <b>TN06010201020_1000</b> Low Flow: <b>889 MGD (1375 CFS)*</b> Water Quality Designation: <b>unavailable conditions water</b> Stream Classification Categories:</p> <table border="1"><tr><th>Domestic Wtr Supply</th><th>Industrial</th><th>Fish &amp; Aquatic</th><th>Recreation</th></tr><tr><td></td><td>X</td><td>X</td><td>X</td></tr><tr><th>Livestock Wtr &amp; Wlife</th><th>Irrigation</th><th>Navigation</th><td></td></tr><tr><td>X</td><td>X</td><td>X</td><td></td></tr></table> <p>Water Quality Assessment: <b>Not supporting recreational use due to PCB contaminated sediments.</b></p>	Domestic Wtr Supply	Industrial	Fish & Aquatic	Recreation		X	X	X	Livestock Wtr & Wlife	Irrigation	Navigation		X	X	X	
Domestic Wtr Supply	Industrial	Fish & Aquatic	Recreation													
	X	X	X													
Livestock Wtr & Wlife	Irrigation	Navigation														
X	X	X														

\* The 1Q10 low flow value was derived from the Tennessee Valley Authority's River Operations program and USGS data.<sup>3</sup> In June 2012 TVA provided the following calculation:

<sup>1</sup> email: david.c.matthews@tn.gov; office phone: 615-532-0485

<sup>2</sup> Provided in application (62,051 GPD industrial flow / 5.05 MGD average flow)

<sup>3</sup> Email, TVA River Operations, Chuck Bohac to Mike Stiefel forwarded to R. Alexander, TDEC, 25 June 12.

Sum of minimum flows at Cherokee Dam and Douglas Dam <sup>4</sup>	<b>910 CFS</b>
Drainage area between dams and confluence of Holston River and French Broad River = 931 sq mile 931 sq mile X 0.5 cfs per sq mile	<b>465 CFS</b>
<b>Total Flow</b>	<b>1375 CFS</b>
1375 CFS X 0.6463 = 889 MGD	<b>889 MGD</b>

As no notable hydraulic operational changes have occurred since 2012, the 889 MGD is preserved from the previous permit.

### 1.1.3. CURRENT PERMIT STATUS

<b>Permit Type:</b>	<b>Municipal</b>
<b>Classification:</b>	<b>Major</b>
<b>Issuance Date:</b>	<b>11/01/12</b>
<b>Expiration Date:</b>	<b>10/31/17</b>
<b>Effective Date:</b>	<b>12/01/12</b>

### 1.1.4. NEW PERMIT LIMITATIONS AND COMPLIANCE SCHEDULE SUMMARY

- a. Total nitrogen and total phosphorus quarterly influent and effluent monitoring have been added to this permit (See section 1.1.10).
- b. Compliance Schedule Summary

Description of Report to be Submitted	Reference Section in Permit
Monthly Discharge Monitoring Reports	1.3.1
Monthly Operational Reports	1.3.4
Monthly Bypass and Overflow Summary Report	1.3.5.1
Industrial Waste Survey Report within 120 days of the effective permit date	3.2.a
Technical review of the need to recalculate local limits within 120 days of the permit effective date	3.2.a
Biomonitoring Report beginning within 180 days of the effective permit date	3.4

- c. For comparison, this rationale contains a table depicting the previous permit limits and effluent monitoring requirements in Appendix 1.

### 1.1.5. PREVIOUS PERMIT DISCHARGE MONITORING REPORT REVIEW

Appendix 2 features a full report of permit exceedances over the last five years and a summary of the discharge monitoring reports over the last 2 years. Ten permit violations have occurred in

<sup>4</sup> From TVA's 1990 Tennessee River and Reservoir System Operation and Planning Review, Table 19-B, p. 68.

the last 5 years, mostly associated with the SSO and inflow and infiltration issues currently being addressed by the ongoing federal consent order. Eight of these violations occurred in 2013, while 1 *e. coli* exceedance occurred in 2015 and one toxicity test failure occurred in 2017. The reduction in violations is expected to continue as KUB completes the improvements associated with their federal consent decree.

Over the previous permit cycle the Knoxville Environmental Field Office has performed several inspections. All of the inspections found the facility to be in compliance. The reports and letters related to the inspections can be found on the division's public data viewer at the following link:

[http://environment-online.state.tn.us:8080/pls/enf\\_reports/f?p=9034:34051:::NO:34051:P34051\\_PERMIT\\_NUMBER:TN0023574](http://environment-online.state.tn.us:8080/pls/enf_reports/f?p=9034:34051:::NO:34051:P34051_PERMIT_NUMBER:TN0023574)

### 1.1.6. Consent Decree with EPA Region 4 and TDEC

On Feb. 11, 2005, the KUB entered a Consent Decree (CD) with the EPA and TDEC involving the Fourth Creek and Kuwahee wastewater treatment plants. The federal CD focused on the prevention of bypasses and SSOs via improved handling of peak wet weather flows in KUB collection systems and treatment plants. In response to the CD, KUB has been implementing a Composite Correction Plan (CCP) and substantially reducing overflows.<sup>5</sup> As illustrated in Figure 1, only 68 wet-weather SSOs occurred in 2015 compared to 272 in 2004 despite a minor reduction in rainfall. In addition, only 11 of those SSOs were caused by heavy rainfall (Figure 2).

Figure 1

Annual Sanitary Sewer Overflow Totals  
(including Building Backups)

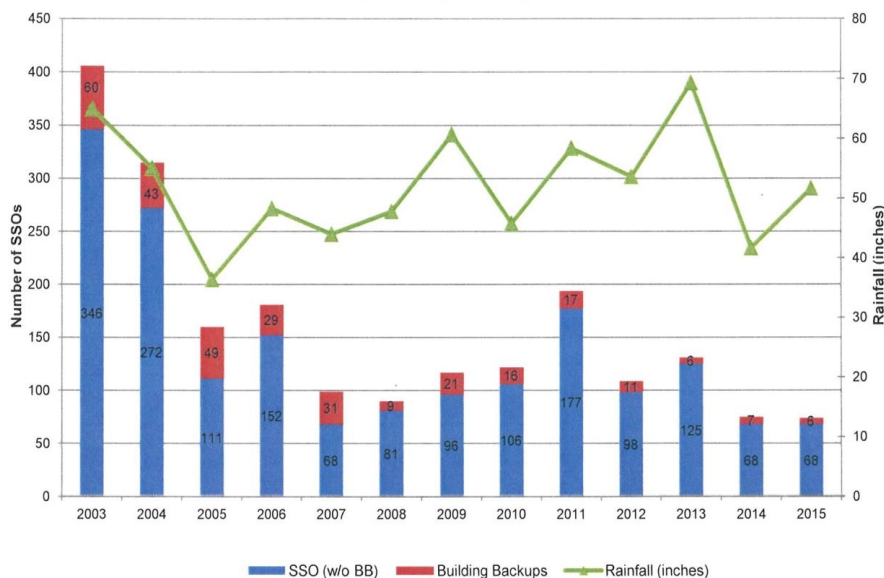
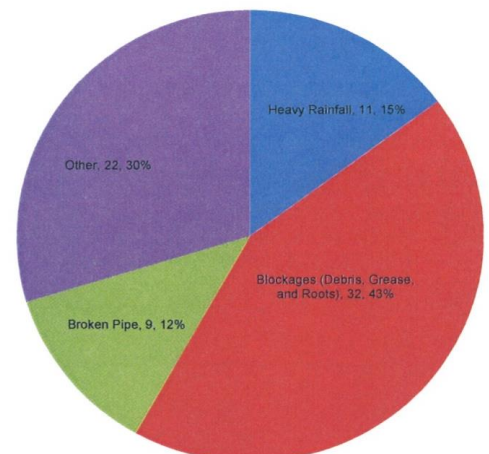


Figure 2

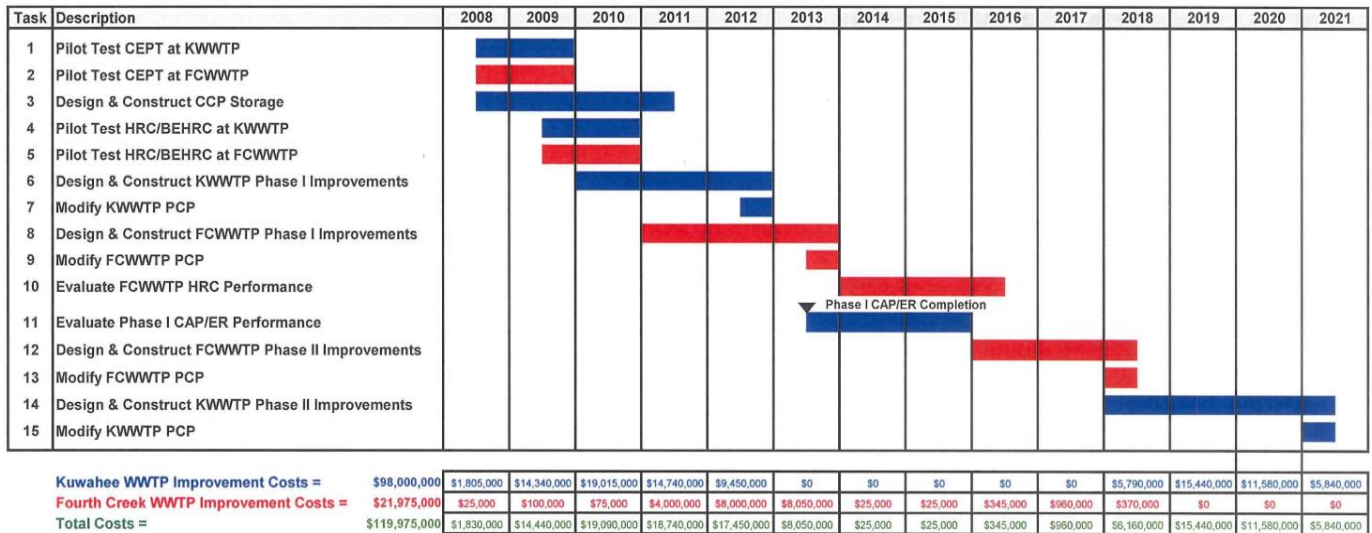
KUB Causes of SSOs in 2015  
(Including Building Backups)



<sup>5</sup> Link for entire SSOER report: <https://www.kub.org/about/environment/environmental-programs/consent-decree-overview/consent-decree-public-document-repository/>

Figure 3 illustrates the treatment plant component of KUB's Composite Correction Plan (CCP). In accordance with the plan, KUB is on schedule to complete final Phase II improvements to Fourth Creek WWTP by June 2018. This means the addition of biologically enhanced treatment to the High Rate Clarifier (HRC), further enabling the plant to treat wet weather flows. At the 2021 deadline, this treatment will be implemented as well at the Kuwahee WWTP. Additional information on KUB's compliance with the CD is available online at the Consent Decree Public Document Repository.<sup>6</sup>

Figure 3 Knoxville Utilities Board CCP: Proposed Implementation Plan Schedule and Conceptual Annual Expenditures<sup>7</sup>



<sup>6</sup> <https://www.kub.org/about/environment/environmental-programs/consent-decree-overview/consent-decree-public-document-repository/>

<sup>7</sup> Figure provided in KUB permit application, accessible on the data viewer:

[http://environmentonline.state.tn.us:8080/pls/enf\\_reports/f?p=9034:34051:::NO:34051:P34051\\_PERMIT\\_NUMBER:TN0023574](http://environmentonline.state.tn.us:8080/pls/enf_reports/f?p=9034:34051:::NO:34051:P34051_PERMIT_NUMBER:TN0023574)

## 5.1. PROPOSED EFFLUENT LIMITS AND RATIONALE

PARAMETERS	MONTHLY AVERAGE CONCENTRATION (MG/L)	MONTHLY AVERAGE AMOUNT (LB/DAY)	WEEKLY AVERAGE CONCENTRATION (MG/L)	WEEKLY AVERAGE AMOUNT (LB/DAY)	DAILY MAXIMUM CONCENTRATION (MG/L)	DAILY MINIMUM PERCENT REMOVAL	RATIONALE
BOD <sub>5</sub>	30	2702	40	3603	45	40	T.C.A. 0400-40-05-.09 (for BOD <sub>5</sub> )
Total Suspended Solids	30	2702	40	3603	45	40	T.C.A. 0400-40-05-.09
Dissolved Oxygen (mg/l)	1.0 (daily minimum) instantaneous	—	—	—	—	—	D.O. protection, Refer to 1.1.7 below
Total Chlorine Residual (mg/l)	—	—	—	—	1.0	—	Refer to 1.1.9 below
Total Nitrogen	—	—	—	—	Report (quarterly)	Report	Tennessee Nutrient Reduction Framework
Total Phosphorus	—	—	—	—	Report (quarterly)	Report	Tennessee Nutrient Reduction Framework
<i>E. coli</i> (colonies/100ml)	126/100 ml	—	—	—	487/100	—	T.C.A. 0400-40-03-.03, Refer to 1.1.11 below
Settle-able Solids (ml/l)	--	—	—	—	1.0 (daily maximum)	—	T.C.A. 0400-40-05-.09
pH (standard units)	between 6.0 and 9.0	—	—	—	—	—	T.C.A. 0400-40-03-.03
Flow (MGD):							
Influent	Report	—	—	—	Report	—	Used to quantify pollutant load
Effluent	Report	—	—	—	Report	—	Used to quantify pollutant load
Whole Effluent Toxicity: IC <sub>25</sub>	1.6 % per sample (quarterly reporting)	—	—	—	—	—	Refer to 1.1.12 below
Sanitary Sewer Overflows, Total Occurrences	Report					—	Refer to 1.1.15 below
Dry Weather Overflows, Total Occurrences	Report					—	Refer to 1.1.15 below
Bypass of Treatment, Total Occurrences	Report					—	Refer to 1.1.15 below

Note: Weekly limitations on BOD<sub>5</sub> and TSS concentrations are given as required per 40 CFR 133.102(a)(2) or 133.102(a)(4)(2) & 133.102 (b)(2) respectively; daily BOD<sub>5</sub> and TSS limitations are authorized by T.C.A. 0400-40-05-.09; monthly and weekly mass loads are limited per 40 CFR 122.45(f) and based on the design flow as per 40 CFR 122.45(b); monthly average percent removal rates for BOD<sub>5</sub> and TSS are required per 40 CFR 133.102(a)(3) or 133.102(a)(4)(iii) and 133.102 (b)(3) respectively. A minimum 40% daily removal rate is required as equivalent to a daily mass load limitation.

#### 1.1.7. BOD<sub>5</sub>, Dissolved Oxygen, and Percent Removals Requirements

- a. Limits from the previous permit are retained in this permit.
- b. Biochemical oxygen demand, or BOD, is a measure of the oxygen used when biological processes break down organic pollutants in wastewater. The amount of oxygen used is more specifically referred to as the five-day biochemical oxygen demand, or BOD<sub>5</sub>. This parameter is used in the wastewater industry to measure both the strength of wastewater and the performance of wastewater treatment processes.

Limits on the oxygen demand remaining in the treated wastewater is often necessary to prevent pollutants in the wastewater from driving oxygen in the receiving stream down below the levels necessary to support fish and aquatic life. Additionally, the breakdown of ammonia into other forms of nitrogen also requires oxygen and therefore exerts an oxygen demand on receiving wastewaters.

For this facility, the monthly average BOD<sub>5</sub> limit of 30 mg/l is a technology-based effluent limit for conventional secondary treatment plants (0400-40-05-.09). The same applies to the weekly average and daily maximum limits. Similarly, the dissolved oxygen effluent limitation of 1.0 mg/l is a practical limit achievable by the facility rather than a water-quality based limit necessary to protect fish and aquatic life.

- b. The treatment facility is required to remove 85% of the BOD<sub>5</sub> and TSS that enter the facility on a monthly basis. This is part of the minimum requirement for all municipal treatment facilities contained in Code of Federal Regulations 40 Part 133.102. The reasons stated by the U.S.E.P.A. for these requirements are to achieve these two basic objectives:
  - (1) To encourage municipalities to correct excessive inflow and infiltration (I/I) problems in their sanitary sewer systems, and
  - (2) To help prevent intentional dilution of the influent wastewater as a means of meeting permit limits.

The treatment facility is required to remove 40% of the BOD<sub>5</sub> and TSS that enter the facility on a daily basis. This percent removal will be calculated three times per week and recorded on the Monthly Operation Report. The number of excursions (days when BOD<sub>5</sub> and/or TSS removal is less than 40%) will be reported on the Discharge Monitoring Report.

#### 1.1.8. NH<sub>3</sub>-N toxicity

To access toxicity impacts, the state utilizes the EPA document, 1999 Update to Ambient Water Quality Criteria for Ammonia, pursuant to 0400-40-03-.0-3(3)(j), and assumed stream temperatures of 25°C and 15°C and pH of 8.0 to derive an



allowable instream protection value protective of chronic exposure to a continuous discharge. A mass balance equation with sewage treatment facility and stream flows and this allowable value determines the monthly average permit limit. The criteria document states that a 30Q5 flow value is protective in deriving allowable values. Where the division has 30Q5 flow values, the division may use them. Otherwise, the division utilizes the available 7Q10 or 1Q10 values that are generally more conservative. The criteria continuous concentrations (CCC) derived from assumed temperature and pH values are as follows:

**CCC values based on temperature and pH, in mg/L:**

Temperature (°C)	7.5 pH	8.0 pH	Temperature (°C)	7.5 pH	8.0 pH
25	2.22	1.24	15	4.22	2.36
27	1.94	1.09	17	3.72	2.07
30	1.61	0.90	20	3.06	1.71

The mass balance equation is as follows:

$$CCC = \frac{Q_S C_S + Q_{STP} C_{STP}}{Q_S + Q_{STP}} \quad \text{or,} \quad C_{STP} = \frac{CCC(Q_S + Q_{STP}) - (Q_S C_S)}{Q_{STP}}$$

where:

CCC = Criteria continuous concentration (mg/l)

$Q_S$  = 1Q10 flow of receiving stream (MGD)

$Q_{STP}$  = Design flow of STP (MGD)

$C_S$  = Assumed/Measured instream  $\text{NH}_3$  (mg/l)

$C_{STP}$  = Allowable STP discharge of  $\text{NH}_3$  (mg/l)

$$C_{STP} = (0.5) \frac{1.24 (889 \text{ MGD} + 10.8 \text{ MGD}) - (889 \text{ MGD} \times 0.1 \text{ mg/l})}{10.8 \text{ MGD}} = 43.4 \text{ mg/l (summer)}$$

$$C_{STP} = (0.5) \frac{2.36 (889 \text{ MGD} + 10.8 \text{ MGD}) - (889 \text{ MGD} \times 0.1 \text{ mg/l})}{10.8 \text{ MGD}} = 90.1 \text{ mg/l (winter)}$$

According to the KUB application, the Fourth Creek WWTP effluent averaged 3.90 mg/l over 758 samples. Because the  $\text{NH}_3$ -N limits calculated above are well beyond the reasonable potential of the plant to discharge, no  $\text{NH}_3$ -N limits are applied to the permit on a toxicity basis.

### 1.1.9. Chlorination

The residual chlorine limit of 1.0 mg/l was established in a previous permit issuance using the CORMIX 3 dilution ratio (61:1) and the EPA instream protection value of 0.019 mg/l for fish and aquatic life. This limit is retained due to the anti-backsliding

provision of 40 CFR 122.44(l) that requires a reissued permit to be as stringent as the previous permit.

#### **1.1.10. Total Nitrogen and Total Phosphorus monitoring/reporting**

Nutrients are naturally occurring and essential components of healthy aquatic systems. Excessive amounts of nutrients, however, can impact water quality. The enrichment of a waterbody with nutrients, called eutrophication, can result in dense, rapidly multiplying growths, or blooms, of algal species and other nuisance aquatic plants. These have potential for negatively impacting the habitat for fish and aquatic life and degrading the water quality for drinking water supply and recreation uses. These impacts can present both locally from an individual activity and much further downstream from the cumulative impact of multiple activities. The division has therefore developed and begun to implement a strategy to accomplish long-term nutrient reduction in Tennessee waters. The document referred to as the Tennessee Nutrient Reduction Framework (NRF), contains proposed rationale and the methodology for implementing the strategy within a watershed area. Consequently, the framework considers impacts from both point and non-point sources of nutrients and potentially recommends reduction goals for both point and non-point sources. The NRF approach to nutrient reduction is intended to utilize an adaptive management approach in consideration of the facts presenting within a watershed and reevaluation of the effectiveness of progress being made. Regular reassessments of goals and action plans will be conducted by reviewing monitoring data, modeling results and other measures of success. As additional data becomes available (such as WWTP effluent characterization and instream water quality data) model results can be re-evaluated. Therefore, for purposes of implementing this strategy, the division is imposing a minimum of quarterly effluent characterization for total nitrogen and total phosphorus on all discharges of treated domestic wastewater. These values will be used to reevaluate the nutrient loads from discharges within a watershed over time for comparison with those loads from non-point sources. The framework may be reviewed on the division's webpage at <http://www.tn.gov/environment/article/wr-ws-tennessee-nutrient-reduction-framework>.

#### **1.1.11. *E. coli* Requirements**

Disinfection of wastewater is required to protect the receiving stream from pathogenic microorganisms. *E. coli* is the indicator organism used as a measure of the bacteriological health of a receiving stream and the effectiveness of disinfection. The *E. coli* daily maximum limit of 487 colonies per 100 ml applies to lakes and exceptional Tennessee waters. A maximum daily limit of 941 colonies per 100 ml applies to all other recreational waters.

#### **1.1.12. Biomonitoring**

The division evaluates all dischargers for reasonable potential to exceed the narrative water quality criterion, "no toxics in toxic amounts". The division has determined that for municipal facilities with stream dilutions of less than 500 to 1, any

of the following conditions may demonstrate reasonable potential to exceed this criterion.

- Toxicity is suspected or demonstrated.
- A pretreatment program is required.
- The design capacity of the facility is greater than 1.0 MGD.

KUB – Fourth Creek meets all three conditions as biomonitoring has occurred since 2007. Thus, the facility will continue semi-annual biomonitoring.

The following calculation is the required dilution at which chronic toxicity testing must meet permit requirements:

$$IC_{25} \% = \frac{\text{Design Flow}}{\text{Low Flow} + \text{Design Flow}} * 100 \geq \frac{10.8}{889 + 10.8} * 100 > 1.2 \%$$

where:

889 = Low Flow - 1Q10 (MGD)  
 10.8 = Design Flow Capacity (MGD)  
 IC<sub>25</sub> = Concentration causing 25% reduction in survival, reproduction and growth of test organisms

This value is less than the value used in the previous permit. Thus the 1.6% limit is retained due to the anti-backsliding provision of 40 CFR 122.44(l).

The permittee shall conduct a 3-Brood Ceriodaphnia dubia Survival and Reproduction Test and a 7-Day Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test on samples of final effluent from Outfall 001.

The measured endpoint for toxicity will be the inhibition concentration causing 25% reduction in survival, reproduction and growth (IC<sub>25</sub>) of the test organisms. The IC<sub>25</sub> shall be determined based on a 25% reduction as compared to the controls, and as derived from linear interpolation. The average reproduction and growth responses will be determined based on the number of Ceriodaphnia dubia or Pimephales promelas larvae used to initiate the test.

Test shall be conducted and its results reported based on appropriate replicates of a total of five serial dilutions and a control, using the percent effluent dilutions as presented in the following table:

Serial Dilutions for Whole Effluent Toxicity (WET) Testing					
4 X PL	2 X PL	Permit Limit (PL)	0.5 X PL	0.25 X PL	Control
% effluent					
6.4	3.2	1.6	0.8	0.4	0

### 1.1.13. Metals and Toxics

Pass-through limitations for heavy metals and other toxic substances have been recalculated as part of the permit issuance process and/or due to changes in industrial waste contribution to the POTW. This POTW is required to implement/maintain a pretreatment program. More frequent monitoring will be required **in the permit** if (a) the reported concentrations approach or exceed calculated allowable values, (b) significant amounts of particular pollutants are present which may impact the treatment process sludge character or the receiving stream, or (c) minimum information is lacking to accurately calculate water quality protection values, in which case additional stream monitoring may also be required.

A summary of the semi-annual report data does not indicate that the potential exists for the water quality criteria for any parameter to be exceeded. Appendix 4 lists the metal and toxic parameters calculations and the procedure used to derive the results.

### 1.1.14. Volatile Organic, Acid-Extractable, and Base-Neutral Compounds

The division evaluated effluent concentrations of volatile organic, acid-extractable, and base-neutral compounds and antimony, arsenic, beryllium, selenium and thallium for potential to violate water quality criteria using the following mass balance equation:

$$C_m = \frac{Q_s C_s + Q_w C_w}{Q_s + Q_w}$$

where:

$C_m$  = resulting in-stream concentration after mixing  
 $C_w$  = concentration of pollutant in wastewater  
 $C_s$  = stream background concentration  
 $Q_w$  = wastewater flow, (STP design flow)  
 $Q_s$  = stream low flow

***to protect water quality:***

$$C_w \leq C_a$$

where:

$C_a$  = STP effluent concentration allowable  
 $= \frac{(S_A) [C_m (Q_s + Q_w) - Q_s C_s]}{Q_w}$

and  $(S_A)$  = the percent "Stream Allocation".

The reasonable potential evaluation uses the following assumptions and procedures:

- a. Stream background concentrations,  $C_s$ , for all volatile organic, acid-extractable, and base-neutral compounds equal zero unless actual stream data exists to show otherwise. Use of the effluent concentrations of such pollutants contributed by upstream dischargers as background is not justifiable due to the volatility and reactivity of these pollutants.
- b. The stream allocation,  $S_A$ , is 90% and is used as a factor of safety.
- c. A mass balance uses the STP design flow, the receiving stream critical low flow (7Q10 or 1Q10), the state water quality numeric criteria, and the stream allocation safety factor to derive the allowable effluent concentrations.
- d. When pollutants have potential to violate standards because the concentrations are below the scan detection levels but could be above the allowable water quality based effluent concentrations, the pollutants are handled one of three (3) ways:
  - i. Additional testing of detected and non-detected pollutants is required if contributing industrial processes are likely to contain them and the effluent scans have not met the minimum required detection levels (RDL) in the state water quality standards or approximated the method detection limits (MDL) of the approved test methods for the pollutants in 40 CFR Part 136.
  - ii. If the required RDL has been used and resulted in non-detection, or if an MDL has been used with non-detection and the contributing industrial processes do not reasonably contain that pollutant, the division drops the pollutant from further consideration.
  - iii. Pollutants detected at levels high enough to violate standards are limited in the permit to the allowable concentration,  $C_w$ , based on STP design flow.

Calculations for this permit have been done using a standardized spreadsheet, titled "WQ Based Effluent Calculations- Other Compounds", and are located in Appendix 5. All metals other than antimony, arsenic, beryllium, selenium, and thallium have been evaluated using procedures described in the rationale, or fact sheet, section headed, "METALS & TOXICS".

The evaluation indicates that volatile organic, acid extractable, and base neutral compounds and antimony, arsenic, beryllium, selenium, and thallium **do not exhibit the reasonable potential to violate water quality criteria and thus will not be given effluent limitations and monitoring requirements in the permit.**

#### **1.1.15. Overflow (sanitary sewer and dry-weather) and bypass reporting**

For the purposes of demonstrating proper operation of the collection, transmission and treatment system, state regulations in 0400-40-05-.07(2) establish "standard conditions." 0400-40-05-.07(2)(n) and 0400-40-05-.07(2)(l) and (m) set forth specific language prohibiting sanitary sewer overflows (defined in the regulations as a "discharge") and bypasses. However, sanitary sewer overflows not reaching state waters are not prohibited. Nonetheless, such overflows may be indicative of other problems, such as improper operation and maintenance of the sewer system. Classifying an incident as a violation or an unavoidable accident (see, e.g., § 69-3-114(a)) will require case-specific evaluations. Regardless, the permit assures,

without waiving rights to pursue other violations associated with any overflow, as applicable, that the permittee would, at a minimum be reporting and responding to all overflows not reaching state waters. Any such overflow potentially warrants permittee mitigation of human health risks via direct or indirect contact and demonstrates a hydraulic problem in the system that warrants permittee consideration as part of proper operation and maintenance of the system.

## **5.2. OTHER PERMIT REQUIREMENTS AND CONDITIONS**

### **1.1.16. Certified Wastewater Treatment Operator**

The waste treatment facilities shall be operated under the supervision of a Grade IV certified wastewater treatment operator in accordance with the Water Environmental Health Act of 1984. Operator grades are under jurisdiction of the Water and Wastewater Operators Certification Board. This NPDES permit is under jurisdiction of the Tennessee Board of Water Quality, Oil and Gas. Operator grades are rated and recommended by the Division of Water Resources pursuant to Rule 0400-49-01 (formerly 1200-05-03) and are included in this fact sheet for reference. The grades are intentionally not specified in the permit so that the operation certification board can authorize changes in grade without conflicting with this permit.

### **1.1.17. Collection System Certified Operator**

The collection system shall be operated under the supervision of a Grade II certified collection system operator in accordance with the Water Environmental Health Act of 1984.

### **1.1.18. Pretreatment Program**

The KUB - Fourth Creek WWTP has an approved pretreatment program. An updated Industrial Waste Survey must be completed within 120 days of the effective date of the permit, unless such a survey has been submitted within 3 years of the effective date.

At least once each reporting period, all permittees with approved pretreatment programs are required to analyze the STP influent and effluent for the following pollutant parameters: chromium (trivalent and hexavalent and total if drinking water use applies), copper, lead, nickel, zinc, silver, cadmium, mercury, total phenols, and cyanide. These pollutants were selected because, historically, they are the ones that tend to be predominant in industrial wastewaters. Other pollutants may be added to the list, as required.

During preparation of this permit, data from **ten** previous semiannual reports were analyzed. If any particular value of a pollutant equals or exceeds 85% of the pass-through limit, the pollutant was added to the list of those that are required to be sampled. Based on our review of the semiannual reports and other documents, sampling for additional pollutants is not required at this time.

#### **1.1.19. Biosolids MANAGEMENT PRACTICES**

The Clean Water Act (CWA) requires that any NPDES permit issued to a publicly owned treatment works or any other treatment works treating domestic sewage shall comply with 40 CFR Part 503, the federal regulation governing the use and disposal of sewage sludge. It is important to note that “biosolids” are sewage sludge that have been treated to a level so that they can be land applied.

The language in subpart 3.3 of the permit, relative to biosolids management, a CWA requirement, allows the “permitting authority” under 40 CFR Part 503.9(p) to be able to enforce the provisions of Part 503. The “permitting authority” relative to Part 503 is either a state that has been delegated biosolids management authority or the applicable EPA Region; in the case of Tennessee it is EPA-Region 4.

Tennessee regulates the land application of non-exceptional quality biosolids under state rules, Chapter 0400-40-15. The state rules became effective on June 30, 2013. Under these state rules, all facilities that land apply non-exceptional quality biosolids must obtain a biosolids permit from the division. The land application of non-exceptional quality biosolids under state rules is regulated through either a general permit or by an individual permit. Questions about the division’s biosolids regulations and permitting program should be directed to the State Biosolids Coordinator at:

State of Tennessee  
Department of Environment and Conservation  
Division of Water Resources  
William R. Snodgrass - Tennessee Tower  
312 Rosa L. Parks Avenue, 11th Floor  
Nashville, Tennessee 37243-1102  
(615) 532-0625

#### **1.1.20. Permit Term**

This permit is being reissued to expire in 2022 in order to coordinate its reissuance with other permits located within the Ft. Loudoun/Little River Watershed.

#### **1.1.21. ELECTRONIC REPORTING**

Monitoring results shall be recorded monthly and submitted monthly using Discharge Monitoring Reports (DMRs) based on the effluent limits in Section 1.1 of the permit. DMRs and DMR attachments, including laboratory data and overflow reports, shall be submitted electronically in [NetDMR](#), or other electronic reporting tool approved by the State, no later than the 15th of the month following the end of the monitoring period. All NPDES program reports must be signed and certified by a responsible official or a duly authorized representative, as defined in 40 CFR 122.22.

The [NPDES Electronic Reporting Rule](#), which became effective on December 21, 2016, replaces most paper-based reporting requirements with electronic reporting

requirements. NetDMR allows NPDES permittees to submit DMRs electronically to EPA through a secure internet application and has been approved by Tennessee as the official electronic reporting tool for DMRs.

According to 40 CFR 127.15, states have the flexibility to grant temporary or episodic waivers from electronic reporting to NPDES permittees who are unable to meet the electronic reporting requirements. To obtain an electronic reporting waiver, an [electronic reporting waiver request](mailto:DWRwater.compliance@tn.gov) must be submitted by email to [DWRwater.compliance@tn.gov](mailto:DWRwater.compliance@tn.gov) or by mail to the following address:

*Division of Water Resources  
Compliance and Enforcement Unit  
William R. Snodgrass Tennessee Tower  
312 Rosa L. Parks Avenue, 11th Floor  
Nashville, TN 37243*

For contact and training information about NetDMR electronic reporting, visit TDEC's website at <http://tn.gov/environment/topic/wr-netdmr-and-electronic-reporting>.

### **5.3. ANTIDEGRADATION STATEMENT/WATER QUALITY STATUS**

Tennessee's Antidegradation Statement is found in the Rules of the Tennessee Department of Environment and Conservation, Chapter 0400-40-03-.06. It is the purpose of Tennessee's standards to fully protect existing uses of all surface waters as established under the Act.

Stream determinations for this permit action are associated with the waterbody segment identified by the division as segment ID# TN06010201020\_1000.

The division has made a water quality assessment of the receiving waters associated with the subject discharge(s) and has found the receiving stream to be neither an exceptional nor outstanding national resource water. However, this water does not support its recreational designated use due to PCBs from contaminated sediment:



ID305b (GIS Link) : <u>TN06010201020_1000</u> , Use Desc : Domestic Water Supply						
Water Name	Location Description	Cause Name	Source Name	Attainment Desc	Assmnt Date	Current cycle
Fort Loudoun Reservoir	Fort Loudoun Reservoir from Dam to Hwy 129 bridge. Ecoregion 67f Loudon County Knox County	-	-	Fully Supporting	23-FEB-15	2017
Water Name	Location Description	Cause Name	Source Name	Attainment Desc	Assmnt Date	Current cycle
Fort Loudoun Reservoir	Fort Loudoun Reservoir from Dam to Hwy 129 bridge. Ecoregion 67f Loudon County Knox County	-	-	Fully Supporting	23-FEB-15	2017
Water Name	Location Description	Cause Name	Source Name	Attainment Desc	Assmnt Date	Current cycle
Fort Loudoun Reservoir	Fort Loudoun Reservoir from Dam to Hwy 129 bridge. Ecoregion 67f Loudon County Knox County	-	-	Fully Supporting	23-FEB-15	2017
Water Name	Location Description	Cause Name	Source Name	Attainment Desc	Assmnt Date	Current cycle
Fort Loudoun Reservoir	Fort Loudoun Reservoir from Dam to Hwy 129 bridge. Ecoregion 67f Loudon County Knox County	-	-	Fully Supporting	23-FEB-15	2017
Water Name	Location Description	Cause Name	Source Name	Attainment Desc	Assmnt Date	Current cycle
Fort Loudoun Reservoir	Fort Loudoun Reservoir from Dam to Hwy 129 bridge. Ecoregion 67f Loudon County Knox County	-	-	Fully Supporting	23-FEB-15	2017
Water Name	Location Description	Cause Name	Source Name	Attainment Desc	Assmnt Date	Current cycle
Fort Loudoun Reservoir	Fort Loudoun Reservoir from Dam to Hwy 129 bridge. Ecoregion 67f Loudon County Knox County	-	-	Fully Supporting	23-FEB-15	2017
ID305b (GIS Link) : <u>TN06010201020_1000</u> , Use Desc : Recreation						
Water Name	Location Description	Cause Name	Source Name	Attainment Desc	Assmnt Date	Current cycle
Fort Loudoun Reservoir	Fort Loudoun Reservoir from Dam to Hwy 129 bridge. Ecoregion 67f Loudon County Knox County	Polychlorinated biphenyls	Contaminated Sediments	Not Supporting	23-FEB-15	2017

PCB limits are not included in this permit because effluent data from the permittee, in conjunction with current PCB regulations, indicates that the facility's discharge has no reasonable potential contribute to the assessed impairment.

## 6.0. ADDENDUM TO RATIONALE

<b>Knoxville Utilities Board (KUB)</b> <b>PERMIT NO. TN0023574</b>
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February 28, 2018  
Addendum prepared by: Mr. David Matthews

In a letter prepared by Mr. Derwin Hagood, P.E., Senior Vice President, Operations dated February 28, 2018, Knoxville Utilities Board (KUB) submitted comments on the draft permit TN0023574.<sup>1</sup> The Division's responses are below.

### 1) Section 1.1 Numeric and Narrative Effluent Limitations Table, Page 1-2

In response to KUB comments on Section 1.1 the Division:

- changed the settleable solids sampling type from "Composite" to "Grab",
- added TSS, BOD, and Flow influent monitoring requirements to section 1.1,
- and changed the qualifiers for both IC25 test limits from ">" to ">=".

### 2) Section 3.2.d.ii POTW Pretreatment Program General Provisions Pollution and Sample Type Table, p19.

The typographical error was corrected by removing the superscript "4" after "Per Method Requirements".

### 3) Rationale, Pg R-1 – Treatment description under facility information does not mention sludge disposal practices.

The Division added "Sludge is pumped to the Kuwahee STP for treatment and disposal" to the treatment description as requested.

### 4) Rationale, Pg R-25 – Cyanide – Effluent Limitation Change

The cyanide pass through limitation error was corrected to match the value provided by the Pretreatment Coordinator.

DCM  
Permit Addendum TN0023574.DOC

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<sup>1</sup> Full comments can be found on the TDEC Dataviewer under permit TN0023574:  
[http://environment-online.tn.gov:8080/pls/enf\\_reports/f?p=9034:34001:0](http://environment-online.tn.gov:8080/pls/enf_reports/f?p=9034:34001:0)



## 7.2. APPENDIX 2

### Compliance and Discharge Monitoring Report Summary

NPDES ID(s): TN0023574  
State: TN  
Major/Minor Indicator: Major  
Violation Date: 01/22/2013 - 01/22/2018  
Violation Type(s):

**Environmental Protection Agency**  
**Integrated Compliance Information System**  
**Violations Report**

Created Date: 09/15/2010  
Refresh Date: 01/22/2018  
Report Version 1.5, Modified: 1/4/2017

#### TN0023574

<b>Permittee Name:</b>	KNOXVILLE-FOURTH CREEK STP	<b>Primary SIC Code:</b>	4952	<b>Permit Issued:</b>	11/01/2012
<b>Permittee Address:</b>	1500 LYONS BEND ROAD KNOXVILLE, TN 37919	<b>Primary SIC Desc:</b>	Sewerage Systems	<b>Permit Effective:</b>	12/01/2012
<b>Major/Minor Indicator:</b>	Major	<b>Primary NAICS Code:</b>		<b>Permit Expired:</b>	10/31/2017
<b>Compliance Track Status:</b>	On	<b>Primary NAICS Desc:</b>		<b>Permit Status:</b>	Admin Continued
<b>DMR Non Receipt Flag:</b>	On	<b>Cognizant Official:</b>	ADONIA PHILLIPS SUP PLT OPER		
<b>RNC Tracking Flag:</b>	On	<b>Cognizant Offcl. Ph.:</b>	865-594-7627		
		<b>Receiving Body:</b>	TENN RI MI 640.0 (FT LOUDON LAKE)		

#### Facility Information

<b>Facility Name:</b>	KNOXVILLE-FOURTH CREEK STP	<b>County:</b>	Knox	<b>FRS ID:</b>	110039849714
<b>Facility Location:</b>	1500 LYONS BEND ROAD KNOXVILLE, TN 37919	<b>Region:</b>	04	<b>Federal Facility Ownership:</b>	N
		<b>State-Region:</b>	03	<b>Type of Ownership:</b>	Municipal or Water District

#### Effluent Violations

Violation Code	Monitoring Period End Date	Limit Set	Parameter	Mon. Loc.	Seas. ID	SNC Group	EA Identifier	Value Type/ Stat. Base	Reported Value/Units	% Exceed.	Limit Value/ Units	RNC Det. Code/ RNC Det. Date	RNC Res. Code/ RNC Res. Date
E90	11/30/2017	001-G	TRP3B - IC25 Static Renewal 7 Day Chronic Chrperiodaphnia	1	0			C1 MINIMUM	.86 %	46%	>=1.6 %		
E90	06/30/2015	001-G	31648 - E. coli, MTEC-MF	1	0			C3 DAILY MX	1,100 #/100ml	126%	<=487 #/100ml		
E90	12/31/2013	001-G	31648 - E. coli, MTEC-MF	1	0			C3 DAILY MX	610 #/100ml	25%	<=487 #/100ml		
E90	04/30/2013	001-G	00530 - Solids, total suspended	1	0	1		C3 DAILY MX	70 mg/l	56%	<=45 mg/l		
E90	04/30/2013	001-G	81011 - Solids, suspended percent removal	K	0	1		C1 DAILY MN	18 %	37%	>=40 %		
E90	01/31/2013	001-G	00400 - pH	1	0			C1	5.8		>=6		
E90	01/31/2013	001-G	00530 - Solids, total suspended	1	0	1		Q2 WKLY AVG	5,338 lb/d	48%	<=3,603 lb/d		
E90	01/31/2013	001-G	00530 - Solids, total suspended	1	0	1		C3 DAILY MX	56 mg/l	24%	<=45 mg/l		
E90	01/31/2013	001-G	81010 - BOD, 5-day, percent removal	K	0	1		C1 DAILY MN	20 %	33%	>=40 %		
E90	01/31/2013	001-G	81011 - Solids, suspended percent removal	K	0	1		C1 DAILY MN	-87 %	212%	>=40 %		

### 7.3. APPENDIX 3

**DMR data Jan 2015 to Dec 2017:**

	Flow				BOD						Total Suspended Solids					
	Influent		Effluent		Monthly				Daily		Monthly				Daily	
Date	Monthly Average MGD	Daily Max. MGD	Monthly Average MGD	Daily Max. MGD	Influent Conc. mg/L	Effluent Conc. mg/L	Percent Removal %	Average Amount lb/day	Influent Conc. mg/L	Effluent Conc. mg/L	Influent Conc. mg/L	Effluent Conc. mg/L	Percent Removal %	Average Amount lb/day	Influent Conc. mg/L	Effluent Conc. mg/L
01/31/2015	6.45	10.62	6.48	11.7	150	3	98%	159	500	4	148	4	97%	205	280	9
02/28/2015	5.95	10.65	5.94	11.36	159	3	98%	163	230	4	175	4	98%	190	330	8
03/31/2015	7.92	12.98	7.91	12.63	123	4	97%	260	210	15	138	5	96%	358	290	16
04/30/2015	6.59	9.58	6.34	9.62	157	4	97%	240	280	6	172	4	98%	207	360	10
05/31/2015	4.95	6.25	4.63	5.49	165	5	97%	189	240	8	169	4	98%	164	240	10
06/30/2015	4.79	8.99	4.32	9.11	173	6	97%	248	300	12	213	7	97%	287	380	22
07/31/2015	6.23	9.42	5.85	9.27	120	5	96%	271	210	8	161	6	96%	332	240	13
08/31/2015	5.02	6.95	456	7.16	141	6	96%	241	200	9	182	6	97%	274	260	15
09/30/2015	4.66	5.21	4.16	4.59	154	5	97%	210	210	14	242	4	98%	161	310	11
10/31/2015	4.40	5.41	4.78	5.81	162	4	98%	142	220	6	255	3	99%	132	360	7
11/30/2015	5.29	12.22	4.88	12.87	154	4	97%	169	240	11	226	5	98%	250	310	15
12/31/2015	8.47	16.97	8.12	15.51	111.00	4	96%	292	190	12	149	7	95%	569	260	20
01/31/2016	6.75	10.39	6.31	10.6	120	3	98%	190	240	5	157	6	96%	330	230	12
02/29/2016	9.66	16.44	9.52	15.79	85	5	94%	383	150	15	106	8	92%	711	190	25
03/31/2016	6.03	8.36	5.77	8.3	125	4	97%	209	170	13	146	4	97%	202	200	10
04/30/2016	5.24	8.53	5	8.72	141	5	96%	218	210	17	177	3	98%	143	280	6
05/31/2016	4.59	5.7	4.37	5.36	177	5.00	97%	197	250	6	249	3	99%	133	470	6
06/30/2016	4.92	8.66	4.52	8.37	159	5	97%	220	210	11	230	3	99%	141	320	6
07/31/2016	4.79	5.93	4.32	5.52	189	5	97%	217	290	7	205	3	99%	123	300	10
08/31/2016	4.69	6.63	5.21	7.04	183	5	97%	239	260	8	223	3	99%	145	440	7
09/30/2016	4.02	4.89	4.53	5.57	225	6	97%	239	430	10	221	4	98%	146	420	10
10/31/2016	3.92	4.05	4.51	6.28	193	4	98%	153	290	21	190	3	98%	101	290	6
11/30/2016	4.37	14.72	4.84	13.38	202	7	97%	302	260	12	201	7	97%	297	320	18
12/31/2016	6.62	12.37	6.98	11.07	149	7	95%	377	260	11	154	8	95%	471	290	12
01/31/2017	6.55	13.09	6.84	12.43	141	5	96%	308	240	9	153	6	96%	351	250	11
02/28/2017	5.09	5.88	5.33	6.15	176	5	97%	237	240	8	197	7	96%	291	300	12
03/31/2017	6.80	9.21	7.02	9.57	132	4	97%	260	210	9	153	4	97%	262	290	10
04/30/2017	8.62	19.82	8.63	18.41	129	5	96%	341	210	8	154	7	95%	540	270	16
05/31/2017	5.64	8.04	6.22	8.76	149	5	97%	267	210	8	181	5	97%	256	340	9
06/30/2017	5.36	8.41	5.86	8.96	167	5	97%	237	380	10	170	3	98%	173	280	10
07/31/2017	5.18	7.77	5.67	8.53	158	5	97%	239	270	13	172	4	98%	191	280	7
08/31/2017	6.24	12.27	6.76	13.3	144	4	97%	210	200	7	170	4	98%	212	300	11
09/30/2017	5.12	9.31	5.59	8.88	156	5	97%	243	250	14	165	4	98%	212	230	12
10/31/2017	5.00	7.56	5.64	9.67	157	5	97%	215	210	7	171	5	97%	254	250	10
11/30/2017	5.04	9.42	5.47	8.62	174	5	97%	227	290	7	190	7	96%	309	300	11
Standard Dev.	1.3	3.7	76.1	3.3	27.5	0.9	0.0	56.8	69.0	3.8	34.2	1.6	0.0	136.8	61.9	4.5
Minimum	3.9	4.1	4.2	4.6	85.0	3.0	0.9	142.0	150.0	4.0	106.0	3.0	0.9	101.0	190.0	6.0
Maximum	9.7	19.8	456.0	18.4	225.0	7.0	1.0	383.0	500.0	21.0	255.0	8.0	1.0	711.0	470.0	25.0
Average	5.7	9.5	18.7	9.6	154.3	4.8	1.0	237.5	250.3	9.9	181.9	4.9	1.0	260.7	298.9	11.5
Permit Limit	--	--	--	--	--	20/25	65%	425/532	--	30/35	--	30	65%	638.0	--	45
Count	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0

Total Suspended Solids						E.coli		Settleable Solids	Dissolved Oxygen		Whole Effluent Toxicity (WET) Testing		Total Residual Chlorine	pH	
Monthly				Daily		Monthly Average Conc.	Daily Max. Conc.	Daily Max. Conc.	Daily Min. Conc.	Daily Max. Conc.	Ceriodaphnia	Pimephales	Daily Max. Conc.	Daily Max. Conc.	Daily Min. Conc.
Influent Conc.	Effluent Conc.	Percent Removal	Average Amount	Influent Conc.	Effluent Conc.										
mg/L	mg/L	%	lb/day	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%	%	mg/L		
148	4	97%	205	280	9	1	2	0.1	5.1				0.94	7.1	6.9
175	4	98%	190	330	8	1	1	0.1	6.9				0.93	7.2	6.9
138	5	96%	358	290	16	1	2	0.1	5.9				0.95	7.2	7
172	4	98%	207	360	10	1	2	0.1	5.8				0.99	7.4	7
169	4	98%	164	240	10	1	2	0.1	5.6				0.95	7.4	6.6
213	7	97%	287	380	22	1	1100	0.1	5.6				0.96	7.2	6.7
161	6	96%	332	240	13	1	4	0.1	5				0.95	7.1	6.8
182	6	97%	274	260	15	1	3	0.1	4.9				0.94	7.2	6.8
242	4	98%	161	310	11	1	1	0.1	5.5				0.94	7.2	6.8
255	3	99%	132	360	7	1	3	0.1	5.7				0.96	7.3	6.9
226	5	98%	250	310	15	1	5	0.1	5.6				0.94	7.2	6.7
149	7	95%	569	260	20	1	6	0.1	5.9				0.98	7.2	6.8
157	6	96%	330	230	12	1	4	0.1	6				0.98	7.1	6.8
106	8	92%	711	190	25	1	4	0.1	4.4				0.98	7.2	6.8
146	4	97%	202	200	10	1	1	0.1	6.1				0.96	7.2	6.9
177	3	98%	143	280	6	1	4	0.1	6				0.88	7.2	6.5
249	3	99%	133	470	6	1	3	0.1	6.1				0.98	7.1	6.7
230	3	99%	141	320	6	1	2	0.1	5.4				0.93	7.1	6.6
205	3	99%	123	300	10	1	1	0.1	5.5				0.8	7.1	6.7
223	3	99%	145	440	7	1	1	0.4	5				0.89	7.1	6.7
221	4	98%	146	420	10	1	1	0.1	5.6				0.94	7.1	6.8
190	3	98%	101	290	6	1	1	0.1	5.8				0.94	7.2	6.8
201	7	97%	297	320	18	1	12	0.1	4.5				0.94	7.2	6.9
154	8	95%	471	290	12	1	5	0.1	4.3				0.96	7.2	6.8
153	6	96%	351	250	11	1	2	0.1	4.6				0.97	7.1	6.9
197	7	96%	291	300	12	1	1	0.1	5.5				0.96	7.1	6.8
153	4	97%	262	290	10	1	6	0.1	5				0.94	7	6.7
154	7	95%	540	270	16	1	5	0.1	4.9				0.94	7.1	6.8
181	5	97%	256	340	9	1	1	0.1	4.8				0.94	7.1	6.8
170	3	98%	173	280	10	1	11	0.1	4.9				0.94	7	6.8
172	4	98%	191	280	7	1	8	0.1	5				0.97	7.1	6.8
170	4	98%	212	300	11	1	1	0.1	5.2				0.94	7.2	6.9
165	4	98%	212	230	12	1	1	0.1	5.1				0.94	7.2	6.9
171	5	97%	254	250	10	1	1	0.1	5.3				0.97	7.2	7
190	7	96%	309	300	11	1	6	0.1	4.7		0.86	> 5.6	0.94	7.2	7
34.2	1.6	0.0	136.8	61.9	4.5	0.0	185.4	0.1	0.6				0.0	0.1	0.1
106.0	3.0	0.9	101.0	190.0	6.0	1.0	1.0	0.1	4.3	0.0	0.9	0.0	0.8	n/a	6.5
255.0	8.0	1.0	711.0	470.0	25.0	1.0	1100.0	0.4	6.9	0.0	0.9	0.0	1.0	7.4	n/a
181.9	4.9	1.0	260.7	298.9	11.5	1.0	34.7	0.1	5.3		0.9		0.9	7.2	6.8
--	30	65%	638.0	--	45	200/100 ml	1000/100 ml	1.0 ml/L	5.0 mg/L	Report	23.0	23.0	0.1	9.0	6.0
35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	0.0	1.0	1.0	35.0	35.0	35.0

7.4. APPENDIX 4

## Metal and Toxic Parameter Calculations

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The following procedure is used to calculate the allowable instream concentrations for pass-through guidelines and permit limitations.

- a. The most recent background conditions of the receiving stream segment are compiled. This information includes:
  - \* 1Q10 of receiving stream ( MGD, USGS)
  - \* Calcium hardness (from Looney Island monitoring site, River Mile 643.3)
  - \* Total suspended solids (Looney Island data)
  - \* Background metals concentrations (if data unavailable, ½ water quality criteria)
  - \* Other dischargers impacting this segment (none)
  - \* Downstream water supplies, if applicable
- b. The chronic water quality criteria are converted from total recoverable metal at lab conditions to dissolved lab conditions for the following metals: cadmium, copper, trivalent chromium, lead, nickel and zinc. Then translators are used to convert the dissolved lab conditions to total recoverable metal at ambient conditions.
- c. The acute water quality criteria are converted from total recoverable metal at lab conditions to dissolved lab conditions for the following metals: cadmium, copper, trivalent chromium, lead, nickel, zinc and silver. Then translators are used to convert the dissolved lab conditions to total recoverable metal at ambient conditions for the following metals: cadmium, copper, lead, nickel and silver.
- d. The resulting allowable trivalent and hexavalent chromium concentrations are compared with the effluent values characterized as total chromium on permit applications. If reported total chromium exceeds an allowable trivalent or hexavalent chromium value, then the calculated value will be applied in the permit for that form of chromium unless additional effluent characterization is received to demonstrate reasonable potential does not exist to violate the applicable state water quality criteria for chromium.
- e. A standard mass balance equation determines the total allowable concentration (permit limit) for each pollutant. This equation also includes a percent stream allocation of no more than 50%.

The following formulas are used to evaluate water quality protection:

$$C_m = \frac{Q_s C_s + Q_w C_w}{Q_s + Q_w}$$

where:

Cm = resulting in-stream concentration after mixing  
Cw = concentration of pollutant in wastewater  
Cs = stream background concentration  
Qw = wastewater flow  
Qs = stream low flow

**to protect water quality:**

$$Cw \leq \frac{(S_A) [Cm (Qs + Qw) - QsCs]}{Qw}$$

where (S<sub>A</sub>) is the percent "Stream Allocation".

Calculations for this permit have been done using a standardized spreadsheet, titled "Water Quality Based Effluent Calculations." Division policy dictates the following procedures in establishing these permit limits:

1. The critical low flow values are determined using USGS data:

Fish and Aquatic Life Protection

7Q10 - Low flow under natural conditions

1Q10 - Regulated low flow conditions

Other than Fish and Aquatic Life Protection

30Q2 - Low flow under natural conditions

2. Fish & Aquatic Life water quality criteria for certain Metals are developed through application of hardness dependent equations. These criteria are combined with dissolved fraction methodologies in order to formulate the final effluent concentrations.
3. For criteria that are hardness dependent, chronic and acute concentrations are based on a Hardness of 25 mg/L and Total Suspended Solids (TSS) of 10 mg/L unless STORET or Water Supply intake data substantiate a different value. Minimum and maximum limits on the hardness value used for water quality calculations are 25 mg/L and 400 mg/L respectively. The minimum limit on the TSS value used for water quality calculations is 10 mg/L.
4. Background concentrations are determined from the division database, results of sampling obtained from the permittee, and/or obtained from nearby stream sampling data. If this background data is not sufficient, one-half of the chronic "In-stream Allowable" water quality criteria for fish and aquatic life is used. If the measured background concentration is greater than the chronic "In-stream Allowable" water quality criteria, then the measured background concentration is used in lieu of the chronic "In-stream Allowable" water quality criteria for the purpose of calculating the appropriate effluent limitation (C<sub>w</sub>). Under these circumstances, and in the event the "stream allocation" is less than 100%, the calculated chronic effluent limitation for fish and aquatic life should be equal to the chronic "In-stream Allowable" water quality criteria. These guidelines should be strictly followed where the industrial source water is not the receiving stream.



Where the industrial source water is the receiving stream, and the measured background concentration is greater than the chronic "In-stream Allowable" water quality criteria, consideration may be given as to the degree to which the permittee should be required to meet the requirements of the water quality criteria in view of the nature and characteristics of the receiving stream.

The spreadsheet has fifteen (15) data columns, all of which may not be applicable to any particular characteristic constituent of the discharge. A description of each column is as follows:

**Column 1:** The "Stream Background" concentrations of the effluent characteristics.

**Column 2:** The "Chronic" Fish and Aquatic Life Water Quality criteria. For cadmium, copper, trivalent chromium, lead, nickel, and zinc, this value represents the criteria for the dissolved form at laboratory conditions. The Criteria Continuous Concentration (CCC) is calculated using the equation:

$$CCC = (\exp \{ m_C [ \ln (\text{stream hardness}) ] + b_C \} ) (CCF)$$

CCF = Chronic Conversion Factor

This equation and the appropriate coefficients for each metal are from Tennessee Rule 0400-40-03-.03 and the EPA guidance contained in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996). Values for other metals are in the total form and are not hardness dependent; no chronic criterion exists for silver. Published criteria are used for non-metal parameters.

**Column 3:** The "Acute" Fish and Aquatic Life Water Quality criteria. For cadmium, copper, trivalent chromium, lead, nickel, silver, and zinc, this value represents the criteria for the dissolved form at laboratory conditions. The Criteria Maximum Concentration (CMC) is calculated using the equation:

$$CMC = (\exp \{ m_A [ \ln (\text{stream hardness}) ] + b_A \} ) (ACF)$$

ACF = Acute Conversion Factor

This equation and the appropriate coefficients for each metal are from Tennessee Rule 0400-40-03-.03 and the EPA guidance contained in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996). Values for other metals are in the total form and are not hardness dependent. Published criteria are used for non-metal parameters.

**Column 4:** The "Fraction Dissolved" converts the value for dissolved metal at laboratory conditions (columns 2 & 3) to total recoverable metal at in-stream ambient conditions (columns 5 & 6). This factor is calculated

using the linear partition coefficients found in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996) and the equation:

$$\frac{C_{\text{diss}}}{C_{\text{total}}} = \frac{1}{1 + \{ [K_{\text{po}}] [\text{ss}^{(1+a)}] [10^{-6}] \}}$$

ss = in-stream suspended solids concentration [mg/l]

Linear partition coefficients for streams are used for unregulated (7Q10) receiving waters, and linear partition coefficients for lakes are used for regulated (1Q10) receiving waters. For those parameters not in the dissolved form in columns 2 & 3 (and all non-metal parameters), a Translator of 1 is used.

- Column 5:** The "Chronic" Fish and Aquatic Life Water Quality criteria at in-stream ambient conditions. This criterion is calculated by dividing the value in column 2 by the value in column 4.
- Column 6:** The "Acute" Fish and Aquatic Life Water Quality criteria at in-stream ambient conditions. This criterion is calculated by dividing the value in column 3 by the value in column 4.
- Column 7:** The "Chronic" Calculated Effluent Concentration for the protection of fish and aquatic life. This is the chronic limit.
- Column 8:** The "Acute" Calculated Effluent Concentration for the protection of fish and aquatic life. This is the acute limit.
- Column 9:** The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Organism Consumption (Recreation).
- Column 10:** The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Water and Organism Consumption. These criteria are only to be applied when the stream use classification for the receiving stream includes both "Recreation" and "Domestic Water Supply."
- Column 11:** The In-Stream Water Quality criteria for the protection of Human Health associated with the stream use classification of Domestic Water Supply.
- Column 12:** The Calculated Effluent Concentration associated with Organism Consumption.
- Column 13:** The Calculated Effluent Concentration associated with Water and Organism Consumption.

**Column 14:** The Calculated Effluent Concentration associated with Domestic Water Supply.

**Column 15:** The Effluent Limited criteria. This upper level of allowable pollutant loading is established if (a) the calculated water quality value is greater than accepted removal efficiency values, (b) the treatment facility is properly operated, and (c) full compliance with the pretreatment program is demonstrated. This upper level limit is based upon EPA's 40 POTW Survey on levels of metals that should be discharged from a POTW with a properly enforced pretreatment program and considering normal coincidental removals.

The most stringent water quality effluent concentration from Columns 7, 8, 12, 13, 14, and 15 is applied if the receiving stream is designated for domestic water supply. Otherwise, the most stringent effluent concentration is chosen from columns 7, 8, 12, and 15 only.

## WQ Based Effluent Calculations

2013 WQC

**WATER QUALITY CALCULATIONS FOR METALS AND OTHER TOXIC SUBSTANCES**  
**WATER QUALITY BASED EFFLUENT CALCULATIONS**  
**OUTFALL 001**

FACILITY: KUB 4th Creek WWTP    PERMIT #: TN0023574    DATE: 1/21/16 CALC BY: DCM

regulated stream worksheet (1Q10)

Stream (1Q10)	Stream (3Q5)	Waste Flow	Ttl. Susp. Solids	Hardness (as CaCO3)	Margin of Safety
[MGD]	[MGD]	[MGD]	[mg/l]	[mg/l]	[%]
889	889	10.80	12	85	50

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Stream Bckgrnd. Conc.	F & AL- instream allowable Calc. Effluent Concentration			Human Health Water Quality Criteria *										effluent
		lab conditions		Fraction	ambient conditions (Tot)		based on F & AL		In-Stream Criteria			Calc. Effluent Concentration **			limited
PARAMETER	[ug/l]	Chronic	Acute	Dissolved	Chronic	Acute	Chronic	Acute	Organisms	Water/Organisms	DWS	Organisms	Water/Organisms	DWS	case
	[ug/l]	[ug/l]	[ug/l]	[Fraction]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	ug/l
Copper (a,b)	0.96	7.81	11.557	0.214	36.419	53.888	1477.61	2205.34	N/A	N/A	N/A	NA	NA	NA	80.0
Total Chromium	0.61	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A			60.0
Nickel (a,b)	2.26	45.42	408.899	0.198	229.738	2068.424	9477.28	86072.18	4600.0			191531.06			180.0
Cadmium (a,b)	0.13	0.22	1.723	0.190	1.156	9.053	42.81	371.77	N/A			NA			5.0
Lead (a,b)	0.51	2.11	54.223	0.134	15.732	403.716	634.37	16796.77	N/A			NA			45.0
Mercury (T) (c)	0.03	0.77	1.400	1.000	0.770	1.400	30.84	57.09	0.051			0.89			0.4
Silver (a,b,e)	0.09	N/A	2.442	1.000	NA	2.442	N/A	98.03	N/A			NA			5.0
Zinc (a,b)	4.64	103.15	102.310	0.118	874.545	867.449	36240.30	35944.71	26000.0			1082901.62			200.0
Cyanide (d)	2.60	5.20	22.000	1.000	5.200	22.000	109.61	809.45	140.0			5725.03			230.0
Toluene									15000.0			624861.11			15.0
Benzene									510.0			21245.28			3.0
1,1,1 Trichloroethane									N/A			NA			30.0
Ethylbenzene									2100.0			87480.56			4.0
Carbon Tetrachloride									16.0			666.52			15.0
Chloroform									4700.0			195789.81			85.0
Tetrachloroethylene									33.0			1374.69			25.0
Trichloroethylene									300.0			12497.22			10.0
1,2 trans Dichloroethylene									10000.0			NA			1.5
Methylene Chloride									5900.0			245778.70			50.0
Total Phenols									860000.0			35825370.37			50.0
Naphthalene									N/A			NA			1.0
Total Phthalates									N/A			NA			64.5

## Background Data for Pass Through Limit Calculations

Stream data for monitoring site TENNE643.3KN at Tennessee River Mile 643.30  
Dates range from 1/23/2008 to 1/23/2018

Characteristic	Average Value	Sample Count	Median Value	Minimum Value	Maximum Value
Cadmium	0.13	40	0.13	0.02	0.5
Chromium	0.61	39	0.45	0.05	2.26
Copper	0.96	40	0.88	0.15	5.5
Cyanide	0.01	26	0	0	0.02
Hardness, Ca, Mg	85.2	40	86	57	130
Lead	0.51	40	0.35	0.11	5.8
Mercury	0.03	40	0.02	0.01	0.1
Nickel	2.26	39	1.4	0.09	5
Silver	0.09	26	0.05	0.01	0.5
Total suspended solids	12.3	37	5	5	160
Zinc	4.64	40	3.2	0.7	39

## SAR Summary

Fourth Creek	PTL 6/13/2007	85% PTLs	PTL 7/20/2012	Oct- 17	Apr- 17	Oct- 16	Apr- 16	Oct- 15	Apr- 15	Oct- 14	Apr- 14	Oct- 13	Apr- 13
COPPER	<b>0.080</b>	<b>0.068</b>	<b>0.080</b>	0.013	0.011	0.012	0.010	0.012	0.009	0.013	0.011	0.012	0.009
CHROMIUM, III		n/a	Report	0.001	0.001	0.001	0.001	0.001	0.001	0.025	0.025	0.025	
CHROMIUM, VI		n/a	Report	0.001	0.001	0.001	0.001	0.001	0.001	0.025	0.025	0.025	
CHROMIUM, TOTAL	<b>0.060</b>	n/a	n/a	0.002	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001
NICKEL	<b>0.180</b>	<b>0.153</b>	<b>0.180</b>	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
CADMIUM	<b>0.005</b>	<b>0.004</b>	<b>0.005</b>	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
LEAD	<b>0.045</b>	<b>0.038</b>	<b>0.045</b>	0.005	0.005	0.005	0.005	0.005	0.005	0.003	0.003	0.003	0.003
MERCURY	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SILVER	<b>0.005</b>	<b>0.004</b>	<b>0.005</b>	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
ZINC	<b>0.200</b>	<b>0.170</b>	<b>0.200</b>	0.068	0.060	0.054	0.044	0.049	0.048	0.053	0.048	0.034	0.035
CYANIDE	<b>0.021</b>	<b>0.182</b>	<b>0.214</b>	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.013
TOLUENE	<b>0.015</b>	<b>0.013</b>	<b>0.015</b>	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
BENZENE	<b>0.003</b>	<b>0.003</b>	<b>0.003</b>	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
1,1,1 TRICHLOROETHANE	<b>0.030</b>	<b>0.026</b>	<b>0.030</b>	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
ETHYLBENZENE	<b>0.004</b>	<b>0.003</b>	<b>0.004</b>	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
CARBON TETRACHLORIDE	<b>0.015</b>	<b>0.013</b>	<b>0.015</b>	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
CHLOROFORM	<b>0.085</b>	<b>0.072</b>	<b>0.085</b>	0.002	0.002	0.003	0.002	0.002	0.001	0.003	0.001	0.002	0.001
TETRACHLOROETHYLENE	<b>0.025</b>	<b>0.021</b>	<b>0.025</b>	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
TRICHLOROETHYLENE	<b>0.010</b>	<b>0.009</b>	<b>0.010</b>	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
1,2 TRANSDICHLOROETHYLENE	<b>0.002</b>	<b>0.001</b>	<b>0.002</b>	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
METHYLENE CHLORIDE	<b>0.050</b>	<b>0.043</b>	<b>0.050</b>	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
TOTAL PHENOLS	<b>0.050</b>	<b>0.043</b>	<b>0.050</b>	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.006	0.006	0.006
NAPHTHALENE	<b>0.001</b>	<b>0.001</b>	<b>0.001</b>	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
TOTAL PHTHALATES	<b>0.065</b>	<b>0.055</b>	<b>0.065</b>	0.020	0.011	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.026

Bolded effluent data exceeds 85% of proposed PTLs (none on this sheet)

Shaded means detection level

## 7.5. APPENDIX 5

## WQ Based Effluent Calculations- Other Compounds

WATER QUALITY BASED EFFLUENT CALCULATIONS														
OUTFALL 001														
FACILITY: KUB Fourth Creek WWTP														
PERMIT: TN0023574														
DATE: 1/24/18														

Stream (1Q10)	Stream (30Q5)	Waste Flow	Ttl. Susp. Solids	Hardness (as CaCO3)	Margin of Safety
[MGD]	[MGD]	[MGD]	[mg/l]	[mg/l]	[%]
889	889	10.8	12.67	85.2	50

1	2	3	5	6	7	8	9	10	11	12	13	14	15
Stream  Bckgrmd.  Conc.	Detection Levels		Fish/Aqua. Life  Water Quality Criteria		Calculated Effluent Concentration		Human Health Water Quality Criteria (30Q5)						Max daily effluent
	Scan	WQC RDL					In-Stream Criteria			Calculated Effluent Concentration			
	MDL	*EPA MDL	Chronic	Acute	Chronic	Acute	Organisms	Water/Org	DWS	Organisms	Water/Org	DWS	
PARAMETER	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]		[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]
ANTIMONY		3.8	3.0				640.0			26660.7			<2.5
ARSENIC	0.42	1.0	1.0	150.0	340.0	6231.3	14146.2			399.3			<2.5
BERYLLIUM		2.0	1.0										<1.0
SELENIUM	0.59	5.0	2.0	5.0	20.0	184.0	808.9						<10.00
THALLIUM		5.0	*										<2.0
ACROLEIN	0.0	50.0	1.0				290.0			12080.6			<1
ACRYLONITRILE	0.0	50.0	1.0				2.5			104.1			<1
BENZENE	0.0	1.0	1.0				510.0			21245.3			<1
BROMOFORM	0.0	1.0	1.0				1400.0			58320.4			<1
CARBON TETRACHLORIDE	0.0	1.0	1.0				16.0			666.5			<1
CHLOROBENZENE	0.0	1.0	*				1600.0			66651.9			<1
CHLORODIBROMO-METHANE	0.0	1.0	*				130.0			5415.5			<1
CHLOROETHANE	0.0	1.0	*										<1
2-CHLORO-ETHYL VINYL ETHER	0.0	1.0	*										<1
CHLOROFORM	0.0	5.0	0.5				4700.0			195789.8			3,000
DICHLOROBROMO-METHANE	0.0	1.0	1.0				170.0			7081.8			2,000
1,1-DICHLOROETHANE	0.0	1.0	1.0				NA			NA			<1
1,2-DICHLOROETHANE	0.0	1.0	1.0				370.0			15413.2			<1
TRANS 1,2-DICHLORO-ETHYLENE	0.0	1.0	*				10000			416574.1			<1
1,1-DICHLOROETHYLENE	0.0	1.0	1.0										<1
1,2-DICHLOROPROPANE	0.0	1.0	*				150.0			6248.6			<1
1,3-DICHLORO-PROPYLENE	0.0	1.0	1.0				210.0			8748.1			<1
ETHYLBENZENE	0.0	1.0	1.0				2100			87480.6			<1
METHYL BROMIDE	0.0	1.0	*				1500.0			62486.1			<1
METHYL CHLORIDE	0.0	1.0	1.0										<1
METHYLENE CHLORIDE	0.0	5.0	1.0				5900.0			245778.7			<1
1,1,2,2-TETRACHLORO-ETHANE	0.0	1.0	0.5				40.0			1666.3			<1
TETRACHLORO-ETHYLENE	0.0	1.0	0.5				33.0			1374.7			<1
TOLUENE	0.0	1.0	1.0				15000			624861.1			<1
1,1,1-TRICHLOROETHANE	0.0	1.0	1.0										<1
1,1,2-TRICHLOROETHANE	0.0	1.0	0.2				160.0			6665.2			<1
TRICHLOROETHYLENE	0.0	1.0	1.0				300.0			12497.2			<1
VINYL CHLORIDE	0.0	1.0	2.0				24.0			999.8			<1
P-CHLORO-M-CRESOL	0.0	10.0	*										<10
2-CHLOROPHENOL	0.0	10.0	*				150.0			6248.6			<10
2,4-DICHLOROPHENOL	0.0	10.0	*				290.0			12080.6			<10
2,4-DIMETHYLPHENOL	0.0	10.0	*				850.0			35408.8			<10
4,6-DINITRO-O-CRESOL	0.0	10.0	24.0				280.0			11664.1			<10
2,4-DINITROPHENOL	0.0	10.0	42.0				5300.0			220784.3			<10
2-NITROPHENOL	0.0	10.0	*										<10
4-NITROPHENOL	0.0	10.0	*										<10
PENTACHLOROPHENOL	0.0	10.0	5.0	15	19	624.9	791.5	30.0		1249.7			<10
PHENOL	0.0	10.0	*					1700000		70817592.6			<10

WATER QUALITY BASED EFFLUENT CALCULATIONS																		
OUTFALL 001																		
FACILITY: KUB Fourth Creek WWTP																		
PERMIT: TN0023574																		
DATE: 1/24/18																		
Stream (1Q10)		Stream (30Q5)		Waste Flow		Tit. Susp. Solids		Hardness (as CaCO3)		Margin of Safety								
[MGD]		[MGD]		[MGD]		[mg/l]		[mg/l]		[%]								
889		889		10.8		12.67		85.2		50								
PARAMETER	1	2	3	5	6	7	8	9	10	11	12	13	14	15				
	Stream	Detection Levels		Fish/Aqua. Life		Calculated Effluent Concentration		Human Health Water Quality Criteria (30Q5)						Max. daily effluent				
	Bckgrnd.	Scan	WQC RDL	Water Quality Criteria				In-Stream Criteria			Calculated Effluent Concentration							
	Conc.	MDL	*EPA MDL	Chronic	Acute	Chronic	Acute	Organisms	Water/Org	DWS	Organisms	Water/Org	DWS					
	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	ug/l				
2,4,6-TRICHLOROPHENOL	0.0	10.0	2.7					24.0	14.0		999.8	583.2		<10				
ACENAPHTHENE	0.0	10.0	*					990.0	670.0		41240.8	27910.5		<5				
ACENAPHTHYLENE	0.0	10.0	2.3											<5				
ANTHRACENE	0.0	10.0	0.7					40000	8300.0		1666296.3	345756.5		<5				
BENZIDINE	0.0	50.0	*					0.0020	0.0009		0.083	0.0		<5				
BENZO(A)ANTHRACENE	0.0	10.0	0.3					0.18	0.038		7.5	1.6		<5				
BENZO(A)PYRENE	0.0	10.0	0.3					0.18	0.038	0.2	7.5	1.6	8.3	<5				
3,4 BENZO-FLUORANTHENE	0.0	10.0	0.3					0.18	0.038		7.5	1.6		<5				
BENZO(GH)PERYLENE	0.0	10.0	*											<5				
BENZO(K)FLUORANTHENE	0.0	10.0	0.3					0.18	0.038		7.5	1.6		<5				
BIS (2-CHLOROETHOXY) METHANE	0.0	10.0	*											<5				
BIS (2-CHLOROETHYL)-ETHER	0.0	10.0	1.0					5.3	0.30		220.8	12.5		<5				
BIS (2-CHLOROISO-PROPYL) ETHER	0.0	10.0	*					65000	1400.0		2707731.5	58320.4		<5				
BIS (2-ETHYLHEXYL) PHTHALATE	0.0	10.0	2.5					22.0	12.0	6.0	916.5	499.9	249.9	<5				
4-BROMOPHENYL PHENYL ETHER	0.0	10.0	*											<5				
BUTYL BENZYL PHTHALATE	0.0	10.0	*					1900.0	1500.0		79149.1	62486.1		<5				
2-CHLORONAPHTHALENE	0.0	10.0	*					1600.0	1000.0		66651.9	41657.4		<5				
4-CHLORPHENYL PHENYL ETHER	0.0	10.0	*											<5				
CHRYSENE	0.0	10.0	2.5					0.18	0.038		7.5	1.6		<5				
DI-N-BUTYL PHTHALATE	0.0	10.0	2.5					4500.0	2000.0		187458.3	83314.8		<5				
DI-N-OCTYL PHTHALATE	0.0	10.0	*											<5				
DIBENZO(A,H) ANTHRACENE	0.0	10.0	*					0.18	0.038		7.5	1.6		<5				
1,2-DICHLOROBENZENE	0.0	1.0	2.0					1300.0	420.0		54154.6	17496.1		<5				
1,3-DICHLOROBENZENE	0.0	5.0	2.0					960.0	320.0		39991.1	13330.4		<5				
1,4-DICHLOROBENZENE	0.0	5.0	2.0					190.0	63.0		7914.9	2624.4		<5				
3,3-DICHLOROBENZIDINE	0.0	10.0	*					0.28	0.2		11.7	8.7		<5				
DIETHYL PHTHALATE	0.0	10.0	1.9					44000	17000.0		1832925.9	708175.9		<5				
DIMETHYL PHTHALATE	0.0	10.0	1.6					1100000	270000.0		45823148.1	11247500.0		<5				
2,4-DINITROTOLUENE	0.0	10.0	1.0					34.0	1.1		1416.4	45.8		<5				
2,6-DINITROTOLUENE	0.0	10.0	*											<5				
1,2 DIPHENYLHYDRAZINE	0.0	10.0	*					2.0	0.4		83.3	15.0		<5				
FLUORANTHENE	0.0	10.0	2.2					140.0	130.0		5832.0	5415.5		<5				
FLUORENE	0.0	10.0	0.3					5300.0	1100.0		220784.3	45823.1		<5				
HEXACHLOROBENZENE	0.0	10.0	1.9					0.0029	0.0028	1.0	0.121	0.1	41.7	<5				
HEXACHLOROBUTADIENE	0.0	10.0	5.0					180.0	4.4		7498.3	183.3		<5				
HEXACHLOROCCYCLO-PENTADIENE	0.0	10.0	*					1100.0	40.0	50.0	45823.1	1666.3	2082.9	<5				
HEXACHLOROETHANE	0.0	10.0	0.5					33.0	14.0		1374.7	583.2		<5				
INDENO(1,2,3-CD)PYRENE	0.0	10.0	*					0.18	0.038		7.5	1.6		<5				
ISOPHORONE	0.0	10.0	*					9600	350.0		399911.1	14580.1		<5				
NAPHTHALENE	0.0	10.0	*											<5				
NITROBENZENE	0.0	10.0	10.0					690.0	17.0		28743.6	708.2		<5				
N-NITROSODI-N-PROPYLAMINE	0.0	10.0	*					5.1	0.050		212.5	2.1		<5				
N-NITROSODI- METHYLAMINE	0.0	10.0	*					30.0	0.0069		1249.7	0.3		<5				
N-NITROSODI-PHENYLAMINE	0.0	10.0	*					60.0	33.0		2499.4	1374.7		<5				
PHENANTHRENE	0.0	10.0	0.7											<5				
PYRENE	0.0	10.0	0.3					4000.0	830.0		166629.6	34575.6		<5				
2,4-TRICHLOROBENZENE	0.0		*					70.0	35.0	70.0	2916.0	1458.0	2916.0	<5				